

## **Appendix C: Examples of Municipal Implementation of Dioxins Pollution Prevention Measures**

## **List of Examples**

### **2,4-D Alternatives**

Central Contra Costa Sanitary District, "Tips for a Healthy Beautiful Lawn," prepared for the San Francisco Bay Area regional "Our Water, Our World" IPM Education campaign by San Francisco Bay Area water quality agencies, January 2001.

City and County of San Francisco, "Getting Past Pesticides: Integrated Pest Management in San Francisco," brochure, undated.

### **Diesel Alternatives**

Alameda County, "Alameda County Public Works Agency Clean Air Vehicle Projects," Case Study, 2002.

California Air Resources Board, "California's Plan to Reduce Diesel Particulate Matter Emissions," Fact Sheet, October 2000.

City and County of San Francisco, Clean Air Ordinance, City and County Of San Francisco Administrative Code, Chapter 85, "Healthy Air and Smog Prevention", Police Code Article 42B, July 15, 1999.

City of Berkeley, City of Berkeley Converts Fleet to 100 Percent Biodiesel, Press Release, June 19, 2003.

City of Palo Alto, "Alternative Fuel Vehicle Policy," undated.

City of Palo Alto, "City of Palo Alto Pilots Biodiesel Fuel at Landfill and Golf Course," Case Study, 2002.

Port of Oakland, "Port of Oakland Vision 2000 Maritime Development Program – Air Quality," Case Study, 2002.

San Francisco International Airport, "SFO's Commitment to Clean Air Vehicles," Fact Sheet, June 2003.

### **Medical Waste Management Alternatives**

Hospitals for a Healthy Environment, "Regulated Medical Waste Reduction: 10 Steps to Implementing a Regulated Medical Waste Reduction Plan," Fact Sheet, undated.

Hospitals for a Healthy Environment, "Case Study on Catholic Healthcare West Hospital System: Environmentally Responsible Principles in Practice," H2E 2002 Award Winner Case Study, undated.

### **Paper Bleaching Alternatives**

Alameda County Waste Management Authority, "Environmentally Preferable Janitorial Paper Supplies in Alameda County," Fact Sheet, October 2002.

City of Palo Alto, "The City of Palo Alto Switch to Paper Processed without Chlorine," Fact Sheet, undated.

### **Pentachlorophenol Alternatives**

City and County of San Francisco, Board of Supervisors, "Resolution urging PG&E, Pacific Bill and manufacturers of non-wood utility poles to conduct a feasibility study of alternatives to chemically treated wood utility poles and urging all utility pole

owners to take steps to protect public health and the environment from wood preservatives in utility poles,” June 18, 2001.

### **PVC Alternatives**

Healthy Building Network, “PVC Free Building Material Alternatives,” product list, June 16, 2003.

Health Care Without Harm, “Alternatives to Polyvinyl Chloride (PVC) and Di-(2-Ethylhexyl) Phthalate (DEHP) Medical Devices,” product list, June 17, 2003.

### **Wood Burning Alternatives**

Bay Area Air Quality Management District, “Woodburning Handbook: Reduce Woodsmoke Pollution by Burning Less Wood or Switching to Natural Gas,” undated.

City of Palo Alto, “City of Palo Alto Woodsmoke-related Dioxin Reduction,” Fact Sheet, undated.

Palo Alto Regional Water Quality Control Plant, “A Growing Concern: Woodsmoke Pollution,” undated.

### **Dioxins and Persistent Bioaccumulative Toxins Resolutions**

Alameda County, Resolution for the County of Alameda Establishing a Policy on Persistent, Bioaccumulative Toxins and their Effects on Public Health and the Environment, 2001.

City of Oakland, Resolution for the City Of Oakland Establishing a Regional Task Force and Policy on Dioxin, Public Health and the Environment, 1999.

## TIPS FOR A HEALTHY

# BEAUTIFUL LAWN

**L**awns can look beautiful without using pesticides and fertilizers that may contribute to water quality problems in a local creek, the Bay or Delta. The tips below will help you maintain a healthy and beautiful lawn that can out-compete weeds and other lawn pests.

### IRRIGATE AN ESTABLISHED LAWN PROPERLY

- Water enough to wet the soil 3" to 4" down. Grass roots will grow deeper and the lawn will be healthier.
- Test for water penetration by gently watering an area for 15 to 30 minutes. Push a shovel into the soil and tilt it forward. If the soil isn't wet 3" to 4" down, continue watering until it is. Track the watering time so you know about how long to water.
- Irrigate slowly so that water doesn't run off. Overwatering can wash

pesticides and fertilizers into the storm drains.

- If water runs off or pools even with slow irrigation, soil compaction may be a problem (see Lawn Aeration on the next page).
- Clay soils hold more moisture and dry out more slowly, thus they may need less frequent irrigation.
- Sandy soils dry out more quickly and may need more frequent irrigation.
- Before you irrigate, check the soil moisture. It should be almost dry before you add more water.

### FEED YOUR SOIL BY LEAVING GRASS CLIPPINGS ON THE LAWN

- Grass clippings can provide most of the nutrients needed by a lawn if the clippings are small enough to decompose quickly without forming mats on top of the living grass. Remove only  $\frac{1}{3}$  of the blade at any one time (see Mow the Right Way, next column).
- To decompose clippings, soil must be biologically active, i.e., contain bacteria, fungi, insects, worms, and oxygen. Soil under a lawn that has been

heavily fertilized or frequently treated with pesticides may be deficient in these elements.

### MOW THE RIGHT WAY

- Remove no more than  $\frac{1}{3}$  of the leaf blade at one cutting. Removing more can be very stressful for the plant and increase pest and disease problems.
- Mow when the grass is dry.
- During the summer months, cut the grass higher to help retain soil moisture.
- Keep mower blades sharp. Dull blades wound the grass and make it more vulnerable to pests and diseases.
- Alternate your mowing pattern frequently to avoid compacted ruts.
- If rust disease is present in your lawn, clean your mower between mowings to prevent spreading the disease.

### DEAL SENSIBLY WITH WEEDS

- Decide how many weeds you can tolerate. It is not realistic to expect a completely weed-free lawn.
- Dig up weeds by hand and sprinkle grass seed on any bare spots so weeds



Choose less toxic products for your home and garden. Look for this symbol before you buy.

can't fill in. Water regularly with a fine spray until the grass sprouts.

- Keep grass growing vigorously to crowd out weeds. Don't mow grass too short; taller blades can shade the soil enough to prevent some weed seeds from germinating.
- Use corn gluten meal to prevent certain broadleaf weeds from germinating. Apply in spring or fall a few weeks before annual weeds begin to germinate.

## LAWN AERATION

- Aerate spots where you can't push a screwdriver five to six inches into the soil, where water pools, where grass looks thin, or where there is heavy traffic.
- Use a hollow-tined aerator that removes plugs of soil, either a foot-operated or motorized model.
- Irrigate deeply (soil should be moist 5" to 6" down) so you can push the aerator into the soil as far as possible. Allow soil to dry slightly before you begin.
- Leave the plugs on the lawn and break them up with a garden rake.

## DETHATCHING LAWNS

- Thatch is dead and dying, matted grass parts that accumulate on top of the soil. Thatch prevents air, water, and fertilizer from reaching the soil.
- Remove thatch with a rake if more than 1/2" thick.
- Aeration (see above) can help prevent thatch buildup.
- When soil is biologically active, grass clippings decompose and do not contribute to thatch buildup. This is a good reason to minimize or eliminate the use of broad-spectrum pesticides.

## FERTILIZING

- Unless the soil texture is sandy, nutrient deficiencies are unlikely and you may not need to fertilize at all. If in doubt, have your soil professionally tested.
- Grass clippings left on the lawn can provide most of the fertilizer.
- If you need to fertilize, use natural fertilizers or slow-release fertilizers, such as sulfur- or polymer-coated urea. These products release nutrients slowly over a longer period, allowing the grass to absorb nutrients more efficiently.
- Fertilizers, if misapplied, can kill soil life and ruin soil structure in even the best soils.

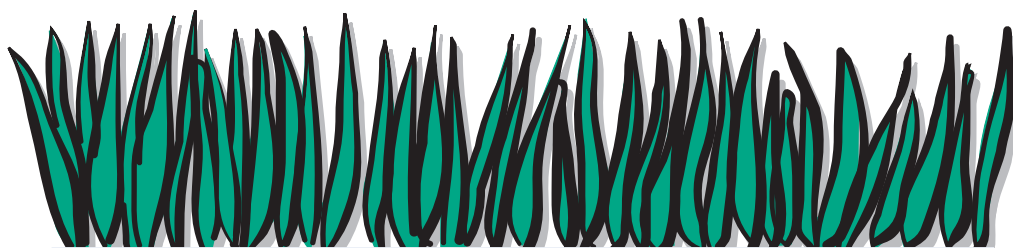
## LAWN SUBSTITUTES

Americans spend a great deal of time on their lawns, using an abundance of water, fertilizer, pesticides, and time. If a grass surface is not required, consider replacing all or some of your lawn with an attractive alternative. The following plants require little water and will accept occasional foot traffic:

- Woolly Yarrow (*Achillea tomentosa*) — Plant from flats or small pots, six inches apart; mow in March and July to a height of two inches.

- Caraway-Scented Thyme (*Thymus herba-barona*) — Plant all thymes from flats or small pots, six to eight inches apart. Mowing is not necessary. Rose-pink flowers cover the plant in early summer and attracts bees.
- Mother of Thyme (*Thymus praecox-arcticus*) — Two to six inches tall with purple and white flowers; mow to 1 1.5 inches in July and fertilize; attracts bees in summer.
- O'Connor's Legume (*Trifolium fragiferum*) — Plant from seed in fall; mow to two inches in April, June, August; attracts bees in summer.
- Garden chamomile (*Chamaemelum nobile*) combined with O'Connor's legume — Plant chamomile from flats or from small pots, six to eight inches apart. Plant O'Connor's legume as mentioned above and mow the two ground covers to two inches in April, June, and August. In areas with serious drainage problems, chamomile may not grow. In those spots, combine O'Connor's legume with any of the thymes listed above.

*Lawn Substitutes section adapted from Coate, B. 1990. Water-conserving plants & landscapes for the Bay Area, 2nd ed. East Bay Municipal Utility District.*



## SOME PREFERRED GRASSES FOR THE BAY AREA

### "Cool Season" Grasses (growing season is during cool weather)

Tall fescue (*Festuca arundinacea*)

Dwarf tall fescue (dwarf varieties of *Festuca arundinacea*)

Red fescue (*Festuca rubra*)

Perennial ryegrass (*Lolium perenne*)



## PLANTING A NEW LAWN

### START OUT RIGHT

- Have your soil professionally tested so you know the texture, pH, and salt and nutrient levels.
- Choose a mixture of the right varieties of grass suited to your climate and the conditions in your yard (see Preferred Grasses for the Bay Area).
- Choose pest- and disease-resistant varieties (ask your nursery).
- Choose sod that has been propagated in soil similar to your own.

### PREPARE THE SOIL BEFORE

#### INSTALLING A NEW LAWN

- Don't work the soil when it is very wet. You can damage its structure.
- Thoroughly mix soil layers of different textures before planting. Poor soil preparation can cause poor drainage resulting in weak turf.
- Break up all clods into fine particles and remove pebbles and stones.
- Check for low spots by irrigating. Smooth out areas where you see puddles (very important if you are seeding a lawn).

### IRRIGATE A NEW LAWN

- Be sure to keep the soil under a new lawn thoroughly moist until the lawn becomes established, but don't drown the plants. Too much water can also wash away seeds.

## WHITE GRUBS



Bay Area lawns sometimes suffer from white grubs, the larval (immature) stage of several species of beetle. The genus of beetles most common in the Bay Area is *Cyclocephala*, the masked chafer. Masked chafer adults do not eat, but in their grub stage can cause patches of lawn to die when they feed on grass roots.

Birds, moles, raccoons, and skunks can add to the damage when they dig in the turf looking for tasty grubs. But just finding wilted patches of grass or animals digging in the lawn does not mean that you have white grubs! You need to find grubs by verifying their presence in several places.

### DETECTION

The C-shaped grubs can be up to an inch long and are white with a brown head and three pairs of conspicuous legs.

Damage from grubs can begin to show as early as June or July or as late as August or September and can be mistaken for wilted grass under drought stress. Later, irregular patches die and can be lifted up or rolled back like a carpet. Grub feeding can make the ground feel spongy.

If you have had white grub problems before or suspect you have them this year, begin looking in mid-May by using a cylindrical bulb planting tool to extract a core of lawn so you can examine the roots. Pay particular attention to spots that look unusual.

### WHAT CAN YOU DO?

- Pay special attention to drainage and compaction. Healthy lawns can recover more easily from white grub damage.
- Walk over your grass wearing spiked sandals (Spikes of Death®) to kill grubs that are feeding near the soil surface.
- Products with imidacloprid may be used to control grubs. This material has a low acute toxicity to mammals. However, if the insecticide becomes as popular as diazinon, its use also may lead to water quality impacts. The best approach for grub control is to maintain a healthy lawn without using insecticides.
- Don't treat late in the season when you find dead patches of turf. By this time grubs have done all their damage for the season and are ready to stop eating. Treating now is fruitless. Remove the dead grass, cultivate, and reseed the area.
- Avoid using insecticides containing diazinon or chlorpyrifos. They are often ineffective because they bind with organic matter in the thatch and do not easily move down into the soil where the grubs are living.
- Plant warm-season grasses, such as bermuda grass or buffalo grass, or cool-season grasses, such as tall or dwarf fescues. These grasses are more tolerant of white grubs.



## PRODUCTS AND RESOURCES

### Soils Laboratory (see also the Yellow Pages)

A&L Western Agricultural Labs  
1311 Woodland Ave., #1  
Modesto, CA 95351  
209-529-4080

### Corn Gluten Meal (pre-emergent herbicide)

Supressa®  
Concern® Weed Prevention Plus

### Spiked Sandals (for grubs and lawn aeration)

Spikes of Death®

### Slow Release Fertilizer

Vigoro® Lawn Fertilizer

### Recommended Reading

- *Down to Earth Natural Lawn Care*, by Dick Raymond, published 1993 by Storey Communications, Inc., Pownal, VT.
- *U.C. PM Pest Management Guidelines: Turfgrass*, ANR Publication #3365-T, edited by M.L. Flint, published 1996 by University of California Division of Agriculture and Natural Resources, Berkeley, CA; (510) 642-2431.
- *The Chemical-Free Lawn*, by Warren Schultz, published 1993 by Rodale Press, Emmaus, PA; (610) 967-5171.

## PESTICIDES AND WATER POLLUTION

Common household pesticides show up in treated wastewater and in Bay Area creeks, sometimes at levels that can harm sensitive aquatic life. So, water pollution prevention agencies have teamed up with participating Bay Area stores to reduce the risks associated with pesticide use. This fact sheet is part of a series of information pieces and store displays aimed at educating Bay Area residents about less-toxic pest management. Look for the “Our Water Our World” logo next to products in participating hardware stores and nurseries throughout the Bay Area.

Pest control strategies and methods described in this publication are consistent with integrated pest management (IPM) concepts, and are based on scientific studies and tests in actual home and garden settings. Use suggested products according to label directions and dispose of unwanted or leftover pesticides at a household hazardous waste collection facility or event. No endorsement of specific brand name products is intended, nor is criticism implied of similar products that are not mentioned.

### FOR MORE INFORMATION

For more information, contact:

**Bio-Integral Resource Center (BIRC)**  
(510) 524-2567

**University of California Cooperative Extension Master Gardeners** in your area  
(in the phone book)

**Central Contra Costa Sanitary District**  
website: [www.centralsan.org](http://www.centralsan.org)

**University of California IPM website:**  
[www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu)

### ACKNOWLEDGMENTS

This fact sheet and the accompanying IPM outreach program was developed by Central Contra Costa Sanitary District with the following contributions:

#### Writing:

Tanya Drlik, Bio-Integral Resource Center  
Michael Baefsky, Baefsky & Associates

#### Design:

Lauren Wohl Design

#### Partial Funding:

Bay Area Pollution Prevention Group  
Bay Area Stormwater Management Agencies Association  
CALFED Bay-Delta Restoration Program  
Regional Water Quality Control Plant  
(Palo Alto)

#### Thank You:

UCCE Master Gardeners  
Participating stores





# Getting Past Pesticides

## Integrated Pest Management in San Francisco



The success of San Francisco's IPM Program depends on the creativity and perseverance of our staff and contractors. This brochure highlights some of the techniques they have employed to find alternatives to pesticides. San Francisco has come a long way since the inception of this innovative program. Similar IPM programs are taking shape in public agencies and school districts across the Country. We are eager to share our experiences and to learn from the experiences of others.

San Francisco adopted an Integrated Pest Management (IPM) Ordinance in 1996. This Ordinance commits the City to minimize the use of pesticides and instead use methods that pose a lower risk to public and environmental health. This IPM program has radically changed the way our City staff manages pest insects, rodents, and weeds.

In San Francisco, IPM means regular monitoring to determine if and when treatments are needed, and employing biological, cultural, mechanical, physical, and educational tactics to prevent pests or keep their numbers down. We emphasize non-chemical control methods, but when pesticides are necessary, we have an approved list of reduced-risk chemicals to meet the need.

Our IPM Program applies to City and County-owned property, including an international airport and port, hospitals, golf courses, jails, office buildings, City Hall, rights-of-way and watershed lands, buses and trains, landscaped parks, and natural areas. While each situation requires a unique approach, IPM provides a clear and effective framework that guides all pest management decisions.

**Cover:** Public Utilities Commission Gardener Supervisor Paul Delgrosso holds a tool that controls weeds with infrared heat.

**Above right:** IPM specialist Ralph Montana releases beneficial insects to fight pests in Golden Gate Park's Conservatory of Flowers. These natural enemies have replaced many of the insecticides formerly used against common pests of plants grown indoors.

### Resources

- San Francisco Department of the Environment**  
415/355-3700  
[www.sfenvironment.com](http://www.sfenvironment.com)  
Copies of the SF IPM Ordinance, Approved Pesticide List, pest fact sheets
- National Pesticide Telecommunications Network (NPTN)**  
800/858-7378  
<http://nptn.orst.edu>  
Talk directly to toxicologists about pesticide questions, emergencies, referrals
- Bio-Integral Resource Center (BIRC)**  
510/524-2567  
[www.birc.org](http://www.birc.org)  
A wide array of publications on practical alternatives to pesticides
- Pesticide Action Network of North America (PANNA)**  
415/981-1771  
[www.pesticideinfo.org](http://www.pesticideinfo.org)  
Comprehensive database on health effects of pesticides, inert ingredients, regulatory issues
- University of California Statewide IPM Project**  
530/752-7691  
[www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu)  
Information and publications on agricultural and urban IPM

### Credits

- Coordination:** Sheila Daar
- Text:** Sheila Daar, Debbie Raphael, Randall Smith, Mark Westlund
- Design:** Lauren Wohl Design
- Assistant:** Janine Goldberg
- Photo Sources:** Sally Bin, Robin Breuer, Sheila Daar, Greg Fischer, Ralph Montana, Debbie Raphael, Lauren Wohl Design, City SF Graphics Dept., MUNI Photography Dept., SFPUC Graphics Dept.



### IPM Accomplishments

There are many ways we measure and recognize successes in our IPM program. Here are just a few accomplishments:

- Passed the first ordinance in the U.S. requiring IPM practices on all City- and County-owned land and buildings
- Eliminated use of the most hazardous pesticides
- Reduced the overall use of pesticides in parks and public spaces by 55%
- Eliminated spray applications of pesticides in and around buildings
- Solved 80% of indoor pest problems reported to the City's structural pest control contractor, without using pesticides
- Implemented many non-chemical control methods, including those highlighted in this brochure



- Created the Mayor's Environmental Service Award for staff achievement in IPM
- Developed model IPM contract language and specifications for selecting pest control contractors
- Utilized volunteer labor to control invasive weeds and restore native vegetation



- Cultivated native plants for use in City landscaping without using pesticides
- Developed an approved list of reduced-risk pesticide products based on human health and environmental criteria
- Received the California Department of Pesticide Regulation's 2001 IPM Innovator Award
- Included on-going public input in IPM program development and oversight
- Developed a web site that provides information on the City's IPM Program ([www.sfenvironment.com](http://www.sfenvironment.com))

- Provided a wide variety of training programs for gardeners, custodians, carpenters and building managers

Looking for efficient weed control plus great entertainment? San Francisco has found both by using herds of goats to clear away poison oak and other problem weeds on steep PUC watersheds, open spaces in parks, and in overgrown areas at the airport. Portable electric fences, herding dogs, and shepherds ensure that goats stick to business in target areas.



### IPM at the San Francisco Public Utilities Commission

San Francisco's Public Utilities Commission (SFPUC) manages extensive watershed and right-of-way lands across Northern California. Its power generating, drinking water, and wastewater systems include over 2,100 miles of pipeline. These vast holdings make the SFPUC San Francisco's largest single IPM practitioner.

The Commission has stepped up to the challenge by developing a detailed IPM plan, appointing coordinators, implementing monitoring and record-keeping systems, and instituting IPM training for its employees. SFPUC has also launched a series of IPM pilot projects to test pesticide alternatives, and conducts ongoing public outreach programs.

SFPUC's IPM successes include:

- Integrating alternative methods including mowing, grazing, controlled burns, and manual removal to suppress weeds on watersheds and rights-of-way
- Using innovative traps and pest-proofing structures to solve rodent problems
- Promoting IPM to the public through the San Francisco Water Pollution Prevention Program's *Our Water, Our World* campaign each spring in stores across the city



SFPUC management is committed to the future of IPM in San Francisco through continuing staff training and educating customers in order to reduce the use of chemical pesticides.



# Highlights of San Francisco's Integrated Pest Management Program



Weed-barrier fabric and mulches (shown during installation) prevent weeds from germinating in flower beds. The porous black fabric blocks weeds while allowing air, water and nutrients to pass through to roots of desirable plants.



A mower cuts roadside brush in city-owned watersheds. Studies are underway to determine the best frequency and season to mow to suppress flammable woody brush and encourage more fire-resistant vegetation to grow in its place.



Trash cans are favored habitats for rats. To reduce rat problems, new pest-proofed trash containers have been installed at San Francisco International Airport. These cans have rodent-proofed lids and plastic liners that facilitate frequent emptying of garbage.



Colorful California wildflowers are grown in median strips along San Francisco streets to outcompete weeds. When landscaping budgets are tight, these inexpensive, fast-growing native plants are used to cover bare soil until permanent plantings and weed-blocking mulch can be installed.



Propane torches ("Flamers") are used on green vegetation to suppress young weeds. When the flame is passed quickly over seedling weeds, their cells collapse and the plants dehydrate and die within hours.



Powerful backpack vacuums are used to remove pest insects from cracks and crevices in and around buildings. These portable tools provide quick, non-chemical removal of infestations of cockroaches, spiders, and other 6- and 8-legged critters. Vacuuming is usually followed by caulking to permanently seal cracks that harbor insects. Under IPM, over 80% of indoor pest control service calls have been solved without use of pesticides.



Demonstrations and training programs focusing on IPM-related equipment are ongoing components of citywide IPM programs. Here, termite-infested buildings are being treated with heat to kill pest insects instead of relying on chemical fumigation.



Habitat restoration partnerships with the San Francisco League of Urban Gardeners (SLUG) have helped eliminate weed problems on the Port of San Francisco's shorelands.



San Francisco's buses and cable cars sometimes attract unwelcome six-legged riders. Instead of spraying inside where the riders are, MUNI inserts low-toxic insecticidal baits into cracks and crevices to kill pests without harming humans.



SFPUC vegetation managers identify native perennial grasses used to outcompete weeds and reduce fire hazards on rights-of-way.



Patients and staff at San Francisco General Hospital spend time in an organic flower garden where they can relax or visit in an environment free of toxic pesticides. The gardeners enhance the healing atmosphere by using hardy, pest-resistant plants, weed barriers, and other alternative methods to keep pest numbers low.



Monitoring for disease with soil probes and other tools, use of organic fertilizers and beneficial soil organisms, judicious water management and other cultural practices have substantially reduced pesticide use on the City's pilot IPM golf course. The success of the pilot program has led to implementation of IPM at the City's bowling green and its four other golf courses.

The City and County of San Francisco's Integrated Pest Management (IPM) program has come a long way since its inception in the Fall of 1996. While the transition to IPM has been very challenging for City staff, and the work to fully institutionalize IPM is ongoing, the benefits are significant.

In compliance with the 1996 IPM Ordinance, pesticides have been put on the back burner wherever possible and replaced with non-chemical methods. These include combinations of biological, cultural, manual, mechanical, and physical controls such as those shown in this brochure. Pest management decisions are increasingly based on IPM monitoring ac-

tivities that improve predictability and efficacy of pest control while reducing pesticide use.

Thanks to the vision of citizens, environmental groups, and political leaders and the ingenuity and hard work of City staff, San Francisco has made significant changes in the way it solves pest problems wherever they occur. This includes inside City buildings, at its international airport and port, in hospitals, along rights-of-way and watersheds, on buses, golf courses, and in neighborhood parks. Clearly, the lessons learned to date, and the record of pest management victories large and small have made it certain that IPM is here to stay.

- Participants**
- The development and operation of the San Francisco IPM Program has been a team effort involving staff from many City/County departments, pest control contractors, IPM consultants, and citizen activist organizations. Key participants include:
- City/County Departments**
    - Department of Consumer Assurance
    - Department of the Environment
    - Municipal Railway
    - Port of San Francisco
    - Department of Public Health
    - Public Utilities Commission
    - Department of Public Works
    - Recreation and Parks Department
    - San Francisco International Airport
  - Pest Control Contractors**
    - Pestec Exterminator Co.
  - IPM Consultants**
    - Steven Ash/IPM-PCA Associates
    - Daar/IPM Consulting Group
    - Lyn Hawkins
    - Slater Pest Control
  - Citizen Activist Groups**
    - Pesticide Watch
    - Washington Toxics Coalition





## **Alameda County Public Works Agency (PWA) Clean Air Vehicle Projects**

*Source: prepared by Pamela Evans, Environmental Health Department with information provided by Tom Gannon, Fleet Manager, phone 925-803-7006.*

Alameda County PWA has carried out a number of 'clean air' vehicle replacement projects since 1999. It has used a Bay Area Air Quality Management District grant to replace a diesel-powered street sweeper with a compressed natural gas (CNG) unit in the Livermore valley area. PWA has used another 'clean air' grant to replace 12 gasoline-fueled passenger cars and trucks with CNG vehicles. Currently, two electric vehicles are on order to replace gas-powered models. In the coming year, PWA will research, and if feasible, implement, a biodiesel fuel pilot project. This case study focuses on the street sweeper and biodiesel initiatives.

### **CNG Street Sweeper – East County**

The CNG street sweeper is housed at the County's state-of-the-art Dublin facility, the sole source of CNG for county vehicles. (County vehicles are fueled only at county facilities.) Due to its limited range, the sweeper services only the Dublin/Pleasanton/Livermore area. As this area suffers the worst overall air quality in Alameda County, it is considered optimal to host a CNG sweeper. The cost of the new CNG sweeper was \$151,000, \$40,000 more than a comparable diesel-powered model.

While the CNG sweeper has worked reasonably well in the field, it suffered major motor damage in December 2001, when a CNG fuel regulator malfunctioned, allowing excess fuel to enter and blow out a piston, requiring \$20,000 in repairs. Although staff has been trained to avoid a recurrence of this problem, the fleet manager anticipates that other misuse mishaps may occur due to working with relatively untested equipment. To prevent, or at least recoup, County costs associated with such problems, PWA takes advantage of enhanced manufacturer endurance-testing protocols and a 100,000-mile warranty.

PWA's Dublin facility had a CNG dispenser for other uses when it obtained the CNG-powered sweeper, so PWA did not incur costs for a new fuel system. A copy of the fuel consumption and vehicle maintenance costs tracking table is on the next page. PWA did not monitor changes in emissions between old and new street sweepers, but did obtain estimates from the original BAAQMD grant proposal announcement. These estimates were not available for this report.

The fleet manager will evaluate the pilot CNG sweeper project and make a decision about expanding it to cover other parts of the County. Expansion would require installation of new fuel dispensing equipment at other County fueling facilities, so those costs would have to be considered in addition to the price of a new sweeper.

### **Biodiesel Pilot**

In the coming year, PWA will study and possibly implement a biodiesel pilot project at the Dublin facility. PWA's fleet uses approximately 90,000 gallons/year of diesel fuel. The plan for the pilot would be to replace 60% of this volume with biodiesel in the first year, followed by replacing the remaining 40% and including a second County facility (in Hayward) in the second year. This change would involve up to 300 vehicles in the first year, and up to 450 by the end of the second year. More than 500 employees would be involved in the full implementation. Biodiesel currently costs 25 to 29 cents more per

gallon than regular diesel, so the cost associated with the new fuel itself over two years is expected to be approximately \$45,000 to \$52,200.

BAAQMD Final Report for Project # 96R125 and 96R126  
for Alameda County Public Works Agency

6/13/00

Reporting Period is from April 1999 Thru May 2000

Fuel Consumption Data		Apr 1999 Thru May 2000		Year		Fuel		Miles		Total Gals		Total Cost		Avg Cost		MPG		CPM	
Veh #	Make	Model	VIN	Year	Engine	Type	Drivn	Miles	Life	Total Gals	Life	Total Cost	Life	Avg Cost	Per Gallon	MPG		Maint & Fuel	
A80N	HONDA	CIVIC	IHGEN1644WL000423	1998	1.6 L 4 Cyl	CNG	2068	2068	140.4	309.60	2.21	14.7	0.507						
A81N	HONDA	CIVIC	IHGEN1642WL000453	1998	1.6 L 4 Cyl	CNG	4136	4136	197.5	480.10	2.43	20.9	0.258						
A82N	HONDA	CIVIC	IHGEN1646WL000424	1998	1.6 L 4 Cyl	CNG	1400	1400	69.6	155.20	2.23	20.1	0.718						
A83N	HONDA	CIVIC	IHGEN1648WL000425	1998	1.6 L 4 Cyl	CNG	2362	2362	40.4	49.80	1.23	58.5	0.455						
A84N	HONDA	CIVIC	IHGEN1648WL000456	1998	1.6 L 4 Cyl	CNG	3550	3550	183.1	395.80	2.16	19.4	0.563						
A85N	FORD	CROWN VICTORIA	2FAFP7398XX122213	1999	4.6 L V-8	CNG	5984	5984	475.3	436.20	0.92	12.6	0.211						
A86N	FORD	CROWN VICTORIA	2FAFP7398XX122214	1999	4.6 L V-8	CNG	7937	7937	512.6	434.80	0.85	15.5	0.195						
K80N	FORD	F250	IFTP727M4WK25651	1998	5.4L Triton V-8	CNG	6270	6270					1.057						
K81N	FORD	F250	IFTP727M6WK25652	1998	5.4L Triton V-8	CNG	8312	8312	388.9	579.10	1.49	21.4	0.835						
K82N	FORD	F250	IFTP727M8WK25653	1998	5.4L Triton V-8	CNG	5068	5068	470.1	339.80	0.72	10.8	0.666						
K83N	FORD	F250	IFTP727MXXWK25654	1998	5.4L Triton V-8	CNG	8212	8212	1517.9	2264.70	1.49	5.4	1.046						
K84N	FORD	F-250	IFTP727M2WK25650	1998	5.4L Triton V-8	CNG	4935	4935	755.1	446.30	0.59	6.5	0.490						
S87F	MOBILE	M-9D CNG	1A9Z24CR5VR059006	1997		CNG	6128	6128	2811.8	4195.70	1.49	2.2	5.364						
Fleet Average																			
									66362.0	5943.8		7825.6		1.32		11.2			1.018

Vehicle Maintenance Cost Data		Apr 1999 Thru May 2000		Year		Fuel		Miles		Repair Labor		Repair Parts		PM Labor		PM Parts		Total Maint	
Veh #	Make	Model	VIN	Year	Engine	Type	Drivn	Miles	Cost	Repair Labor	Cost	Repair Parts	Cost	PM Labor	Cost	PM Parts	Cost	Total Maint	Cost
A80N	HONDA	CIVIC	IHGEN1644WL000423	1998	1.6 L 4 Cyl	CNG	2068	2068	\$ 385.00	\$ 214.51	\$ 115.50	\$ 23.36	\$ 738.37						
A81N	HONDA	CIVIC	IHGEN1642WL000453	1998	1.6 L 4 Cyl	CNG	4136	4136	\$ 343.48	\$ 111.85	\$ 115.50	\$ 14.85	\$ 585.68						
A82N	HONDA	CIVIC	IHGEN1646WL000424	1998	1.6 L 4 Cyl	CNG	1400	1400	\$ 505.56	\$ 215.12	\$ 115.50	\$ 13.38	\$ 849.56						
A83N	HONDA	CIVIC	IHGEN1648WL000425	1998	1.6 L 4 Cyl	CNG	2362	2362	\$ 462.00	\$ 192.75	\$ 346.50	\$ 24.38	\$ 1,025.63						
A84N	HONDA	CIVIC	IHGEN1648WL000456	1998	1.6 L 4 Cyl	CNG	3550	3550	\$ 908.61	\$ 563.97	\$ 115.50	\$ 15.82	\$ 1,603.90						
A85N	FORD	CROWN VICTORIA	2FAFP7398XX122213	1999	4.6 L V-8	CNG	5984	5984	\$ 385.00	\$ 268.34	\$ 154.00	\$ 18.70	\$ 826.04						
A86N	FORD	CROWN VICTORIA	2FAFP7398XX122214	1999	4.6 L V-8	CNG	7937	7937	\$ 689.98	\$ 111.83	\$ 269.50	\$ 39.87	\$ 1,111.18						
K80N	FORD	F250	IFTP727M4WK25651	1998	5.4L Triton V-8	CNG	6270	6270	\$ 2,330.07	\$ 4,052.88	\$ 192.50	\$ 51.53	\$ 6,626.98						
K81N	FORD	F250	IFTP727M6WK25652	1998	5.4L Triton V-8	CNG	8312	8312	\$ 3,195.50	\$ 2,876.30	\$ 231.00	\$ 56.95	\$ 6,359.75						
K82N	FORD	F250	IFTP727M8WK25653	1998	5.4L Triton V-8	CNG	5068	5068	\$ 885.50	\$ 1,983.15	\$ 154.00	\$ 15.03	\$ 3,037.68						
K83N	FORD	F250	IFTP727MXXWK25654	1998	5.4L Triton V-8	CNG	8212	8212	\$ 3,255.15	\$ 2,832.15	\$ 192.50	\$ 44.31	\$ 6,324.11						
K84N	FORD	F-250	IFTP727M2WK25650	1998	5.4L Triton V-8	CNG	4935	4935	\$ 462.00	\$ 1,377.71	\$ 115.50	\$ 16.08	\$ 1,971.29						
S87F	MOBILE	M-9D CNG	1A9Z24CR5VR059006	1997		CNG	6128	6128	\$ 13,314.11	\$ 13,707.84	\$ 1,155.00	\$ 500.53	\$ 28,677.48						
Fleet Totals									66,362.0	\$ 27,121.96	\$ 28,508.40	\$ 834.79	\$ 59,737.65						

The biggest complaint we receive from drivers of the CNG vehicles is the driving range and lack of fueling infrastructure. We operate 1 fast fill station at our Dublin location which has been working well but there is no close facility in our Hayward location. Hayward Unified School District is planning a facility which will be in close proximity of our Hayward location and should help relieve this situation. The vehicles performance has been good.

We are planning to install slow fill Fuel Makers at our Turner Ct location in Hayward which should also help increase the use of the vehicles.

Report by Tom Gannon Fleet Manager, Alameda County Public Works



## California's Plan to Reduce Diesel Particulate Matter Emissions

### Why is ARB concerned about emissions from diesel-fueled engines?

Diesel engines emit a complex mixture of air pollutants, mainly composed of gaseous and solid material. The visible emissions you can see in diesel exhaust are known as particulate matter. These include many carbon particles (also called soot) as well as other gases that become visible as they cool. In 1998, California identified diesel particulate matter (diesel PM) as a toxic air contaminant based on its potential to cause cancer and other adverse health effects. In addition to PM, emissions from diesel-fueled engines include over 40 other cancer causing substances. Overall, emissions from diesel engines are responsible for the majority of the potential airborne cancer risk in California.

### What are the major sources of diesel PM?

The major sources of diesel PM are the 1,250,000 diesel-fueled engines and vehicles in use in California. This includes trucks and buses you see on our highways, large off-road equipment such as bulldozers and tractors, engines used in portable equipment such as cranes, refrigerating units on trucks, and stationary engines used to generate power or pump water. All together, these diesel engines release over 25,000 tons per year of particulate matter into California's air. About two-thirds of these emissions come from off-road equipment.

#### Typical Diesel Equipment

##### On-Road

- Trucks
- Buses
- Motor Homes

##### Portable

- Cranes
- Drilling Equipment
- Portable Pumps

##### Off-Road

- Construction Vehicles
- Agricultural Equipment
- Trains
- Marine Vessels

##### Stationary

- Power Generation
- Stationary Pumping Equipment

### What does ARB plan to do to reduce emissions from diesel equipment?

In September 2000, the Air Resources Board (ARB) approved a comprehensive Diesel Risk Reduction Plan (Plan) to reduce diesel emissions from both new and existing diesel-fueled engines and vehicles. The goal of the Plan is to reduce diesel PM emissions and the associated health risk by 75 percent in 2010 and 85 percent by 2020.

### What does the Plan propose?

The Plan is a roadmap that identifies the steps ARB will be taking to develop specific regulations to reduce diesel PM emissions. The Plan identifies 14 measures that will be developed over the next several years to:

- Establish more stringent emission standards for new diesel-fueled engines and vehicles;
- Establish particulate trap retrofit requirements for existing engines and vehicles where traps are determined to be technically feasible and cost-effective;
- Require the sulfur content of diesel fuel to be reduced to enable the use of advanced diesel PM emission controls; and
- Evaluate alternatives for diesel-fueled engines and vehicles.

## **What new engine standards will be developed?**

For new on-road vehicles, the Plan envisions engine standards that will reduce diesel PM emissions by at least 90 percent from current on-road standards. The emission standards for new off-road vehicles would be similar to those for on-road vehicles.

## **What about existing diesel engines?**

For existing diesel engines and vehicles, the Plan envisions the addition of exhaust emission control systems, collectively referred to as retrofit technology. The retrofit technology most likely to be used are diesel particulate traps, which can reduce diesel PM emissions by at least 85 percent. An important aspect of the retrofit effort will be identifying those applications where retrofits make sense. To help in this task, the ARB has formed an International Retrofit Advisory Committee to identify feasible and effective ways to implement diesel PM retrofits. Our goal is to ensure that existing diesels are as clean as cost-effective technology allows.

## **Will diesel engines used in agriculture be regulated?**

Both new and existing diesel agricultural engines will be evaluated for control. We are sensitive to the economic impacts that this program may have and will work closely with the agricultural community to develop practical solutions that obtain the greatest pollution reduction for the dollars spent. The ARB will work with the agricultural industry to assess which existing engines should be retrofitted. This will take into account how and where the equipment is used, and its value and remaining life.

## **How much will this cost?**

Detailed cost analysis will be done during the development of each control measure. We expect the costs to be similar to those associated with ARB's programs for controlling emissions from gasoline-fueled engines and vehicles.

## **What are the benefits of implementing the Plan?**

The Plan will significantly reduce diesel PM emissions and the associated potential cancer risk, decrease noncancer health affects (such as asthma and bronchitis), and improve visibility.

## **What are the next steps?**

ARB will work with stakeholders to develop the specific measures needed to implement the Plan. Public workshops and meetings on specific measures will begin in December 2000. ARB will also work to develop and implement voluntary programs, including incentives-based programs like the Carl Moyer Program. We will also work with manufacturers and owners on demonstration projects to ensure that retrofit technology will work for each application. To be notified about workshops and meetings, sign up on the web at <http://www.arb.ca.gov/diesel/dieselprr.htm>

## **For more information?**

Please contact the ARB's Public Information Office at (916) 322-2990, or ARB web site at <http://www.arb.ca.gov>

You may obtain this document in an alternative format by contacting ARB's ADA Coordinator at (916) 322-4505 (voice); (916) 324-9531 (TDD, Sacramento area only); or (800) 700-8326 (TDD, outside Sacramento).

***The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our web site: [www.arb.ca.gov](http://www.arb.ca.gov).***

# CITY AND COUNTY OF SAN FRANCISCO ADMINISTRATIVE CODE

## CHAPTER 85

### Healthy Air and Smog Prevention

#### Police Code Article 42B

#### Table of Contents

- Sec. 85.1. - Findings and Purpose.
- Sec. 85.2. - Definitions.
- Sec. 85.3. - Clean Air Program Establishment, Duties and Funding.
- Sec. 85.4. - Clean Air Advisory Committee Establishment and Composition.
- Sec. 85.5. - Alternative Fuel Infrastructure.
- Sec. 85.6. - Electric Vehicle Charging Infrastructure.
- Sec. 85.7. - Procurement of Vehicles by City Departments.
- Sec. 85.8. - Operation of Bi-fuel Vehicle.
- Sec. 85.9. - Department of Public Transportation Buses and Trolley Buses.
- Sec. 85.10. - Regional Public Sector and Private Sector Fleets.

#### **SEC. 85.1. FINDINGS AND PURPOSE**

The Board of Supervisors finds that:

(a) Industries, automobiles, and natural sources all contribute to a significant air pollution problem in the Bay Area. While air pollution in the Bay Area has decreased since its peak in 1969, the growth in population, increase in industrial development, and in particular, the dramatic increase in vehicles and vehicle miles traveled, threaten to overcome the air quality successes to date.

(b) Air pollution is a major public health concern in the United States. The American Lung Association estimates the nationwide health costs of air pollution to be in the billions of dollars. According to the United States Public Health Service, high levels of air pollution can cause or aggravate lung illnesses such as acute respiratory infections, asthma, chronic bronchitis, emphysema, and lung cancer. Coughing, wheezing, chest pain, eye irritation, and headaches are common reactions to air pollution. Children, the elderly, athletes, and people with compromised immune systems suffer the worst health problems caused by poor air quality. In these sensitive groups, poor air quality causes more significant health impacts such as breathing difficulties, weakening of the body's ability to resist disease, and hindering the development of lung capacity among children.

(c) A recent federal study found that long-term exposure to air pollution in the four (4) Bay Area counties could cause 208 additional cases of cancer for every million residents, which is 208 times greater than the acceptable risk of cancer caused by air pollution as established by the Clean Air Act of 1990. The study concludes that most of the cancer risk is attributable to two chemicals contained in vehicle exhaust—benzene, a component of gasoline, and butadiene, a by-product of fuel combustion. This study is significant because it calculated the cancer risks based on the air that people actually breathe, rather than on computer models.

(d) Air pollution causes other significant economic costs. These costs from air pollution include damage to plants, animals, buildings and structural materials. Agricultural losses in California caused by air pollution are estimated to be \$300 million each year. Deterioration of buildings, metal, rubber, and painted surfaces (e.g.: the cost to clean buildings resulting from diesel soot) cost millions of dollars each year. Decreased visibility, often called "haze," degrades the natural beauty of the Bay Area and secondarily, this can affect tourism and economic growth. A 1996 University of California at Davis study estimated the total national cost from automobile generated air pollution to be between \$24 and \$450 billion per year.



(e)Over one hundred types of air pollutants exist. The most serious and persistent outdoor air quality problem in the Bay Area is high levels of ground level ozone or smog. Ozone is formed as the result of a complex photochemical process which occurs when certain volatile organic compounds and gases (predominantly oxides of nitrogen from automobile combustion) react with sunlight and high temperatures. Since automobile travel is responsible for over half of the chemicals that cause high ozone levels in the Bay Area, replacement of polluting vehicles by less polluting vehicles is a crucial element in the continued health of the residents and businesses of San Francisco.

(f)The Clean Air Act mandates the United States Environmental Protection Agency (EPA) to establish national air quality standards that would ensure the same basic health and environmental protection for all Americans. The Bay Area Air Quality Management District (BAAQMD) uses the Pollutant Standard Index (PSI) to report air pollution information to the public, as well as to monitor compliance with the Clean Air Act. The EPA sets the National Ambient Air Quality Standard (NAAQS) to represent the concentration of a pollutant above which adverse health effects have been observed.

(g)In the past five (5) years, the Bay Area has violated the NAAQS for ozone twenty-nine (29) times. As a result, the EPA has reclassified the Bay Area as a Nonattainment area for the federal one-hour ozone standard. The loss of ozone attainment status will force the BAAQMD to adopt stricter regulations from a list of measures in the state implementation plan (SIP), a requirement under the Clean Air Act. New regulations will adversely effect Bay Area businesses and possibly automobile owners. Stricter air quality regulations translate to higher costs for everyone and may cause fewer businesses to be created and retained in the Bay Area. The EPA is presently implementing a new ozone monitoring standard which will likely further jeopardize the future attainment status of the Bay Area and lead to adoption of even stricter standards by BAAQMD.

(h)Over ninety percent (90%) of Californians live in regions adversely affected by air quality problems, largely as a result of automobile exhaust. A program to control automobile emission in California began in 1961, far in advance of federal controls. The State of California conducts its own vehicle emissions control program that is stricter than federal standards. Nevertheless, the Bay Area continues to violate state ozone standards at an alarming rate, with one-hundred and twelve (112) exceedance over the past five (5) years. In 1988, the California Legislature enacted the California Clean Air Act, which requires each air district not meeting state air quality standards to prepare a Clean Air Planthat would achieve the standards. The Clean Air Plan contains regulations that affect both Bay Area businesses and residents.

(i)In 1990, the California Air Resources Board adopted the Low-Emission Vehicle (LEV) regulation, which requires auto manufacturers to produce vehicles that meet increasingly stringent air quality standards. These regulations originally required that, beginning in 1998, two percent (2%) of all vehicles sold by auto manufacturers to be zero emission vehicles (ZEVs). These regulations have since been modified to eliminate the phase-in of ZEV sales requirement for 1998 through 2000 model years in favor of a ZEV demonstration program during this period. The new regulations retain the prior requirement that beginning with the 2003 model year, ten percent (10%) of all vehicles sold in California must be ZEVs.

(j)In 1997, the Board of Supervisors approved the Sustainability Plan for the City and County of San Francisco. The Sustainability Plan states, "[a]chieving and maintaining good air quality is crucial to the public health and economic vitality of San Francisco."

(k)The United States imports over fifty percent (50%) of its oil. This high dependence on imported oil has become a major national security concern for the Federal Government.

(l)To address this national security issue, Congress passed the Energy Policy Act of 1992 (EPACT) and directed the Department of Energy (DOE) to establish a variety of programs aimed at substantially reducing the quantity of oil consumed by motor vehicles. EPACT requires the Federal Government to phase in fleet acquisitions of alternative fuel vehicles. DOE is in the process of rulemaking to determine whether alternative fuel vehicle acquisition requirements for private and local government automobile fleets are necessary to achieve EPACT's clean air and energy security goals. DOE is promoting the voluntary use of alternative fuel vehicles through its Clean Cities programs.

(m)DOE officially recognized the San Francisco Clean Cities Coalition (SFCCC) in 1994 as a Clean Cities program. SFCCC has ongoing programs of substituting conventional transportation fuels with domestically produced, clean burning alternative fuels; encouraging an increase in acquisition and utilization of alternative fuel vehicles (AFVs); developing alternative fuel supply infrastructure and related services; advancing public understanding of the benefits and costs of using AFVs. SFCCC members include: the Department of Administrative Services, Department of Public Transportation, Public Utilities Commission, San Francisco International Airport, San Francisco County Transportation Authority, BAAQMD, City College of San Francisco, Pacific Gas and Electric Company, United States Department of Energy, United States National Park Service, United States General Services Administration, United Airlines, NorCal Waste Management, Inc., Olympian Oil Company, and the San Francisco Bay Area Clean Air Vehicle Coalition (the precursor organization to the Clean Cities Coalition).

(n)The City and County of San Francisco currently operates over one hundred and thirty (130) AFVs. These vehicles have proved themselves to be cost effective and were easily integrated into the City's fleet operations. The use of low emission AFVs by the City has been beneficial to the air quality in the Bay Area.

(o)Under this Chapter, the City and County of San Francisco wishes to exercise its power to make economic decisions involving its own funds as a participant in the marketplace and to conduct its own business as a municipal corporation to ensure that purchases and expenditures of public moneys are made in a manner consistent with the policy of improving the air quality in the City and in the Bay Area through the purchase and use of low emission AFVs and ZEVs.

(p)Under this Chapter, the City and County of San Francisco wishes to foster, promote, and encourage the use of low emission AFVs and ZEVs by developing infrastructures to support the use of these vehicles.

(q)Under this Chapter, a Clean Air Program is established to aid the City and County of San Francisco in identifying funding sources for the purchase of low emission AFVs and ZEVs, to assist the City in the development of alternative fuel infrastructures, to develop a clean air plan for the City and County of San Francisco, and to educate and promote the use of low emission AFVs and ZEVs in the private and public sectors. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

## **SEC. 85.2. DEFINITIONS.**

(a)"Alternative Fuel" means any fuel other than gasoline, diesel, and other substantially petroleum-based fuels that is less polluting than gasoline or diesel fuel, as determined by the California Air Resource Board. Alternative Fuel shall include, but is not limited to, natural gas and electricity.

(b)"Alternative Fuel Vehicle" means any motor vehicle powered by alternative fuels.

(c)"Bi-Fuel Vehicle" means any motor vehicle designed to operate on two (2) fuels, one of which is an alternative fuel, but not on a mixture of fuels.

(d)"Bus" means any passenger vehicle with a seating capacity of greater than fifteen (15) persons.

(e)"Car-Sharing Program" means a program in which automobile providers are established to make motor vehicles available to people on a per-use basis.

(f)"City Department" means any department of the City and County of San Francisco. City department does not include any other local agency or any federal or State agency, including but not limited to the San Francisco Unified School District, the San Francisco Community College District, the San Francisco Redevelopment Agency, and the San Francisco Housing Authority.

(g)"Construction Vehicle" means any motor vehicle intended for use in the construction, repair, and/or demolition of structures or roadways and which is not licensed for use on public roads.

(h)"Electric Charging Bay" means a device used to restore the electromotive power of a battery in an electric vehicle.

(i)"Electric Vehicle" means a zero emission vehicle that derives its motive power from one (1) or more electric motors.

- (j) "Fast-Fueling" means a fueling process that refuels an alternative fuel vehicle in the same or less time than traditional refueling methods.
- (k) "Heavy Duty Vehicle" means any motor vehicle, licensed for use on roadways, having a manufacturer's gross vehicle weight rating greater than 14,000 pounds.
- (l) "Hybrid Electric Bus" means a bus having an on-board internal combustion engine attached to an electric generator.
- (m) "Light Duty Truck" means any motor vehicle, with a manufacturer's gross vehicle weight rating of 6,000 pounds or less, which is designed primarily for purposes of transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.
- (n) "Medium Duty Vehicle" means any 1995 and subsequent-model year vehicle having a manufacturer's gross vehicle weight rating of 14,000 pounds or less and which is not a passenger vehicle or light-duty truck.
- (o) "Motor Vehicle" means a self-propelled vehicle.
- (p) "Motorized Equipment" means any implement powered by an internal combustion engine. Motorized Equipment shall not include equipment regulated pursuant to Section 21.18-6 of this code.
- (q) "Natural Gas Bus" means a bus powered by natural gas.
- (r) "Natural Gas Fueling Station" means any fueling station that provides fueling services for motor vehicles fueled by natural gas.
- (s) "NOX" means oxides of nitrogen.
- (t) "Particulate Matter (PM)" means solid or liquid particles of soot, dust, smoke, fumes, aerosols or other airborne material.
- (u) "PM10" means particulate matter less than ten (10) microns in diameter.
- (v) "PM2.5" means particulate matter less than two and five-tenths (2.5) microns in diameter.
- (w) "Passenger Vehicle" means any motor vehicle designed primarily for transportation of persons and having a design capacity of twelve (12) persons or less.
- (x) "Portable Motorized Equipment" means motorized equipment that is capable of being carried or moved from one location to another. Indicia of portability or transportability include, but are not limited to, wheels, skids, carrying handles, a dolly, a trailer, or a platform.
- (y) "Stationary Motorized Equipment" means motorized equipment that remains or will remain at a single site at a building, structure, facility, or installation for more than twelve (12) consecutive months.
- (z) "Trolley Bus" means an electric-powered bus that derives its motive power from overhead wires.
- (aa) "Ultra-Low Emission Vehicle" means any motor vehicle that meets or exceeds the standards set forth in 13 California Code of Regulations § 1960.1 for Ultra-Low Emission Vehicles.
- (ab) "Zero-Emission Vehicle" means (i) any motor vehicle that produces zero exhaust emissions of all criteria pollutants, as defined by 17 California Code of Regulations § 90701(b), (or precursors thereof) under any and all possible operational modes and conditions or (ii) any vehicle that has been certified by the California Air Resources Board as a zero-emission vehicle. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

### **SEC. 85.3. CLEAN AIR PROGRAM ESTABLISHMENT, DUTIES AND FUNDING.**

- (a) There is hereby established a program to be known as the Clean Air Program in the City and County of San Francisco in the Department of Administrative Services.
- (b) Subject to the budget, fiscal and Civil Service provisions of the Charter, the Director of Administrative Services shall appoint an individual who shall be responsible for the day-to-day Program operations, including but not limited to supervision of staff and budgeting. The Clean Air Program shall be responsible for supervising the implementation of the provisions of this Chapter, assisting with the expansion of the



alternative fueling network in the City and County of San Francisco, assisting with City department financing and acquisition of ultra-low or zero emission vehicles and equipment, performing outreach to residents and private sector fleet operators to encourage the purchase of ultra-low and zero emission vehicles and equipment, promoting automobile trip reduction by City employees, developing educational programs to train City employees in the use of alternative fuel vehicles and equipment and in techniques that reduce fuel consumption, encouraging the development of car-sharing programs, and serving as San Francisco's Clean Cities Coordinator, under the Clean City Program of the U.S. Department of Energy. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.4. CLEAN AIR ADVISORY COMMITTEE ESTABLISHMENT AND COMPOSITION.**

(a) There is hereby established a committee to be known as the Clean Air Advisory Committee (hereinafter "Advisory Committee") of the City and County of San Francisco.

(b) The Advisory Committee should consist of twelve (12) voting members. The members shall consist of:

2 representatives from the Department of Administrative Services,

1 representative from the Department of Public Transportation,

1 representative from the Department of Public Works,

1 representative from the Airport Department,

1 representative from Public Utilities Commission,

1 representative from San Francisco County Transportation Authority,

1 representative from the Department of Public Health;

2 public representatives from environmental organizations which have as a major focus advocating for cleaner air,

2 public representatives with significant expertise in clean air vehicles, equipment, or related technology.

(c) The public members shall be appointed by the Board of Supervisors. The members representing City departments shall be appointed by the Director of the respective departments.

(d) The term of office for the appointed public members shall be one (1) year. In the event of a vacancy occurring during the unexpired term of office of the public members, a successor shall be appointed in a manner similar to that for the initial member to complete the unexpired term of the office vacated.

(e) The Bay Area Air Quality Management District is invited to appoint one (1) representative who may serve as a non-voting ex officio member of the Advisory Committee.

(f) At the initial meeting and annually thereafter the Advisory Committee members shall elect such officers as deemed necessary by the Advisory Committee.

(g) The Advisory Committee shall establish rules and regulations for its own organization and procedure and shall meet when necessary as determined by the Advisory Committee. Except as provided by general law, all meetings shall be open to the public.

(h) The Advisory Committee shall have the power and duty to:

(1) Set up subcommittees as necessary;

(2) Advise the Mayor and the Board of Supervisors on all matters related to air pollution including, but not limited to: alternative fuel vehicle purchasing and infrastructure development.

(3) Assist City departments in identifying and applying for grants for the acquisition of alternative fuel vehicles and grants for the development of alternative fuel infrastructure within the City and County of San Francisco. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.5. ALTERNATIVE FUEL INFRASTRUCTURE.**

(a) Natural Gas Fueling Stations—Assessment and Recommendations. Not later than six (6) months from the effective date of this Chapter, the Planning Department, in cooperation with the Clean Air Program, shall assess the need for a competitive network of public access natural gas fast-fueling stations in the City and County of San Francisco and shall provide a report to the Board of Supervisors detailing the results of the assessment. Such report shall include recommendations for legislative action that may be required to achieve the goal set forth in subsection (b).

(b) Development of Natural Gas Fueling Stations. Not later than eighteen (18) months from the effective date of this Chapter, the Planning Department, in cooperation with the Department of Building Inspection, shall coordinate the siting and development of not fewer than five (5) public access natural gas fast-fueling stations by public and/or private entities within the City and County of San Francisco. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.6. ELECTRIC VEHICLE CHARGING INFRASTRUCTURE.**

(a) Establishment of Pilot Program. Not later than eighteen (18) months from the effective date of this Chapter, the Department of Parking and Traffic in consultation with the Department of Building Inspection shall implement a pilot program to install a total of fifty (50) public access, dedicated electric charging bays in at least six (6) City-owned garages, parking lots, and/or other sites accessible to the public.

(b) Planning and Assessment. Not later than eighteen (18) months from the effective date of this Chapter, the Department of Parking and Traffic, in cooperation with the Clean Air Program, shall develop and recommend to the Board of Supervisors a plan for creating a comprehensive electric charging infrastructure for electric vehicles in the City and County of San Francisco. Such plan shall include:

(1) A market demand assessment for electric charging infrastructure needs within the City and County of San Francisco based on California Air Resource Board mandates for zero-emission vehicle sales and projected sales within the Bay Area;

(2) An assessment of public and private funding options available for installation of charging bays in all City-owned parking garages and lots by the year 2003; and

(3) Tax-based or other incentive programs to encourage the installation of electric charging bays in privately owned parking facilities located in the City and County of San Francisco. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.7. PROCUREMENT OF VEHICLES BY CITY DEPARTMENTS.**

(a) Passenger Vehicles and Light-Duty Trucks. Except as set forth in subsection (e), beginning 90 days from the effective date of this Chapter, all City departments shall purchase or lease only models of passenger vehicles and light duty trucks that are rated as ultra-low emission vehicle or zero emission vehicle. Commencing July 1, 2000, at least ten percent (10%) of all passenger vehicles and light duty trucks purchased or leased by the City within any fiscal year shall be zero emission models. The Mayor's Office and the Director of Administrative Services shall review annual and supplemental vehicle funding requests from City departments to ensure that this requirement is met each fiscal year.

(b) Medium Duty Vehicles. Except as set forth in subsection (e), beginning 90 days from the effective date of this Chapter, City departments shall purchase or lease only Medium Duty Vehicles with engines having exhaust emissions levels rated as ultra-low emission or super ultra-low emission pursuant to Section 1956.8(h) of Title 13 of the California Code of Regulations or Medium Duty Vehicles that are rated as ultra-low emission or super ultra-low emission pursuant to Section 1960.1(h)(2) of Title 13 of the California Code of Regulations.

(c) Heavy Duty Vehicles. Except as set forth in subsection (e), beginning 90 days from the effective date of this Chapter, when purchasing or leasing Heavy Duty Vehicles, City departments shall purchase or lease only Heavy Duty Vehicles whose engines are certified under the optional standards for their exhaust emissions pursuant to Section 1956.8 of Title 13 of the California Code of Regulations.

(d) Motorized Equipment. Except as set forth in subsection (e), City departments shall purchase or lease only portable or stationary motorized equipment that is powered by alternative fuels.

(e)Exemptions.

(1)Notwithstanding any other provisions of this Chapter, this Section shall not apply to any motor vehicles that are used for public safety purposes. Such vehicles shall include, but are not limited to: police vehicles, fire vehicles, ambulances, and other emergency response vehicles. Nothing in this subsection shall be construed to prohibit City departments from purchasing or leasing motor vehicles used for public safety purposes that satisfy the requirements of this section. It shall be the policy of the City to purchase or lease emergency response vehicles that comply with the requirements of this section to the extent that the purchase or lease of such vehicles is feasible and practical.

(2)This Section shall not apply to the acquisition of buses by the Public Transportation Department for its fleet.

(3)Upon a written request from a City department, the Director of Administrative Services may grant an exemption to the requesting City department from the requirements of this Section under the following circumstances:

(A)Where the requesting department demonstrates that no model of motor vehicle or motorized equipment is available which will comply with the requirements of this Section and meet the specifications of the department for its intended use. In deciding whether to grant an exemption pursuant to this subparagraph, the Director of Administrative Services shall consider the availability of funding for the purchase or lease of motor vehicles or motorized equipment mandated by this Section.

(B)Where the requesting department demonstrates to the satisfaction of the Director of Administrative Services each of the following:

(i)That the cost of the vehicle or motorized equipment that complies with the requirements of this Section is more than one and a half times the cost of an equivalent low emission vehicle or motorized equipment powered by gasoline or diesel fuel;

(ii)That the department has applied for, but failed to receive, funding for the purchase or lease of the vehicle or motorized equipment that complies with the requirements of this Section from sources other than the City's General Fund; and

(iii)That the amortized cost differential cannot be recovered over the operating life of the vehicle or motorized equipment that complies with the requirements of this Section through a reduction in fuel, maintenance, and other costs incurred during the operating life of such vehicle or equipment.

(C)Where the requesting department demonstrates to the satisfaction of the Director of Administrative Services that the use of vehicle or motorized equipment that complies with the requirements of this Section would significantly disrupt departmental operations due to the lack of adequate fueling and/or maintenance facilities for those motor vehicles or motorized equipment.

(4)Where the Director of Administrative Services grants an exemption pursuant to paragraph (3), the requesting department shall purchase or lease the model of motor vehicle or motorized equipment that will meet its specifications and has the lowest available ratings for emissions of NOX and PM10, and, if applicable, PM2.5 established by the California Air Resources Board for the type or class of vehicle or motorized equipment being purchased or leased.

(d)Rules and Regulations. The Director of Administrative Services may promulgate such regulations as may be necessary from time to time to carry out the requirements of this section.

(e)List of Vendors. The Director of Administrative Services shall develop a comprehensive list of vendors supplying motor vehicles and motorized equipment that comply with the requirements of this section for use by City departments in making purchasing or leasing decisions.

(f)Other Requirements. All motor vehicles and motorized equipment purchased or leased pursuant to this section shall meet all applicable safety standards and other requirements for the intended use of the vehicle or equipment.



(g)Funding. It shall be the policy of the City to: (1) use monies that are not part of a City department's regular appropriation, including, but not limited to, regional, state, or federal grants, to fund the entire purchase or lease price of ultra-low or zero emission vehicles or motorized alternative fuel equipment that is used in a pilot program or demonstration project; and (2) in all other cases, use such monies only to fund the difference in purchase or lease price between the ultra-low or zero emission vehicle or motorized alternative fuel equipment and the gasoline or diesel-fueled motor vehicle or motorized equipment that would otherwise be purchased or leased. City departments may consult with the Clean Air Advisory Committee regarding funding opportunities for the purchase of alternative fuel vehicles.

(h)Annual Report. Not later than September 1 of each fiscal year, the Director of Administrative Services shall submit to the Mayor and the Board of Supervisors a report which includes a summary of motor vehicles and motorized equipment purchased or leased by City departments. Such report shall include a comparison of (i) the annualized projected maintenance and fueling costs for each type or class of motor vehicle and motorized equipment purchased or leased pursuant to this section, (ii) the estimated annualized maintenance and fueling costs for vehicles and motorized equipment that would otherwise be purchased or leased, and (iii) the projected reduction in the emissions of NOX, PM10 and, if applicable, PM2.5 from motor vehicles and motorized equipment purchased or leased pursuant to this section.

(i)Phase Out of Highly Polluting Vehicles and Equipment. Not later than eighteen (18) months from the effective date of this Chapter, each City department, with the cooperation of the Director of Administrative Services, shall develop and recommend to the Board of Supervisors a plan to phase out the use of older and highly polluting motor vehicles and motorized equipment that have been in service for twelve (12) or more years. Such plan shall include, but is not limited to, a study into the feasibility of centralizing the purchase and ownership of City motor vehicles within the Department of Administrative Services, which are leased to City Departments on an as-needed basis. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.8. OPERATION OF BI-FUEL VEHICLE.**

No bi-fuel vehicle owned by the City may be powered by gasoline, diesel, or other petroleum-based fuel while operating within the City and County of San Francisco. Bi-fuel vehicles owned by the City shall bear a notice stating the requirements of this subsection, posted in one or more locations that are plainly visible to the vehicle operator. This section shall not apply to (1) the operation of bi-fuel vehicles in emergency situations or (2) the operation of buses by the Public Transportation Commission. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.9. DEPARTMENT OF PUBLIC TRANSPORTATION BUSES AND TROLLEY BUSES.**

(a)Pilot Program. For the purpose of developing fueling specifications for the first planned Department of Public Transportation bid package after the effective date of this chapter to replace existing diesel-powered buses, the Public Transportation Commission, with input from the Transportation Authority, shall implement an alternative fuels pilot program to evaluate the efficacy of using alternative fuel buses to reduce air pollution while maintaining current level of service and safety. This program shall include testing of both dedicated natural gas and hybrid electric buses.

(b)Identification and Conversion of Diesel Bus Lines. Not later than six (6) months from the effective date of this Chapter, the Public Transportation Commission shall identify heavily traveled diesel bus lines that are appropriate for conversion to cleaner, quieter electric trolley bus lines. The Public Transportation Commission and the Planning Department shall develop proposed street amenities, including, but not limited to, light standards and street landscaping, designed to mitigate the aesthetic impact of any proposed overhead wires. Residents in the neighborhoods surrounding such bus lines shall be provided with notice and an opportunity to comment on the proposed plan.

(c)Phase-Out of Diesel Buses. Not later than eighteen (18) months from the effective date of this Chapter, the Public Transportation Commission shall develop a plan to phase out the use of diesel buses that have been in service for a time period greater than the time period set forth by the applicable federal funding guidelines. (Added by Ord. 258-99, File No. 990624, App. 10/15/99)

#### **SEC. 85.10. REGIONAL PUBLIC SECTOR AND PRIVATE SECTOR FLEETS.**

(a)Regional Public Transportation Authorities. Not later than twelve (12) months from the effective date of this Chapter, the Clean Air Program in consultation with the Advisory Committee, shall develop a plan, including incentives, to encourage the regional public sector transit agencies to use buses that are classified as zero emission or cleaner emission vehicles on bus lines that originate or terminate in San Francisco.

(b)Private Sector Fleets. Not later than twelve (12) months from the effective date of this Chapter, the Clean Air Program in consultation with the Advisory Committee, shall develop a plan, including incentives, to encourage private sector fleets that operate a significant number of motor vehicles within the City and County of San Francisco to convert, their fleets to zero emission vehicles or motor vehicles that comply with the requirements of Section 85.7 of this Chapter.

(c)Residential Vehicles. Not later than twelve (12) months from the effective date of this Chapter, the Clean Air Program in consultation with the Advisory Committee, shall develop a plan, including incentives, to encourage residents of the City and County of San Francisco to purchase zero-emission vehicles or motor vehicles that comply with Section 85.7 of this Chapter.

(d)San Francisco Unified School District. Upon request by the San Francisco Unified School District, the Transportation Authority and the Public Transportation Commission shall assist the school district with the development of bid specifications and/or contract requirements requiring the use of alternative fuel school buses in the District's bid package for school bus service. Upon request by the San Francisco Unified School District, the Transportation Authority and the Public Transportation Commission shall also assist the school district with the preparation of applications for local, regional, state, and/or federal funding to pay for part or all of the costs of such buses.

(e)Car-Sharing Program.The Clean Air Program, in consultation with the Advisory shall assist the Department of Parking and Traffic and the Planning Department and other Federal and State agencies in the development of car-sharing programs in all high density urban neighborhoods of the City. Such neighborhoods shall include, but are not limited to, Nob Hill, North Beach, Russian Hill, Castro, Tenderloin, Telegraph Hill, Downtown, Mission, Hayes Valley, Haight, Mission Bay, Treasure Island, and the Presidio.  
(Added by Ord. 258-99, File No. 990624, App. 10/15/99)

**For Immediate Release**

## **CITY OF BERKELEY CONVERTS FLEET TO 100 PERCENT BIODIESEL**

*City to Sponsor Biodiesel Exhibition*

**Berkeley, California (Thursday,  
June 19, 2003)** – The City of Berkeley  
will celebrate a milestone on June 24,  
2003 at the City's Biodiesel Vehicle  
Exhibit recognizing Berkeley's



conversion to 100% Biodiesel diesel vehicles. The conversion has  
been in place for the last six months and is now planned for the  
long term. To the best of its knowledge, Berkeley is the first city of  
its size in the country to convert to 100% Biodiesel for virtually an  
entire fleet.

The Exhibit and a ceremony will be held from 6:30 until 7:00 p.m. at  
Berkeley's Old City Hall, located at 2134 Martin Luther King, Jr.  
Way. The Exhibit will feature a variety of 100% Biodiesel vehicles  
from the Departments of Public Works, Parks, Fire, Police, and  
Health and Human Services, and will include vehicle and Biodiesel  
experts.

"The City of Berkeley has a long history of innovation and as a  
leader in public policy," said Weldon Rucker, City Manager of  
Berkeley. "The use of Biodiesel fuel is yet another example. By  
embracing this technology, the City of Berkeley will provide a  
practical demonstration of the viability of this fuel alternative."

Biodiesel is comprised of vegetable oil, usually soybean oil. It has  
numerous advantages including less than half the emissions

produced by petroleum-based diesel, according to the U.S. Environmental Protection Agency (EPA). Biodiesel also can be derived from recycled vegetable oil. It is far safer to transport, store, and use because it is not a hazardous material like petroleum products. Biodiesel also reduces dependence on highly polluting oil, environmentally destructive oil drilling, and wars and military interventions involving the world oil market.

100% Biodiesel, also called B100, is in use in over 180 of the City's diesel vehicles representing 90 percent of its fleet of 200 diesel vehicles. The remaining 10 percent of diesel vehicles are Fire Department vehicles that will be converted to 100% Biodiesel when accommodations are made for delivering Biodiesel to the more remote Fire Stations throughout the City.

As a leader in environmental initiatives, Berkeley has already used other cleaner fuels including all-electric, electric-gas hybrids, compressed natural gas (CNG), and, formerly, 20% Biodiesel. The Berkeley Ecology Center, which collects recyclables and converted to 100% Biodiesel over a year ago, was an early advocate for the City to convert from its 20% Biodiesel to the 100% level. The City's conversion to 100% Biodiesel was fully supported by the Berkeley City Council and six citizen advisory commissions.

###



**City of Palo Alto**  
**Alternative Fueled Vehicles Purchasing Policy**

Equipment Management will, whenever possible, purchase vehicles and equipment that can use alternative fuels, such as compressed natural gas (CNG), propane, or electricity. Consideration will be given to the availability of suitable vehicles, cargo carrying requirements, and the range and response requirements of the specific application.

*City of Palo Alto Palo Alto Policies & Procedures 4-1, Item 8.*

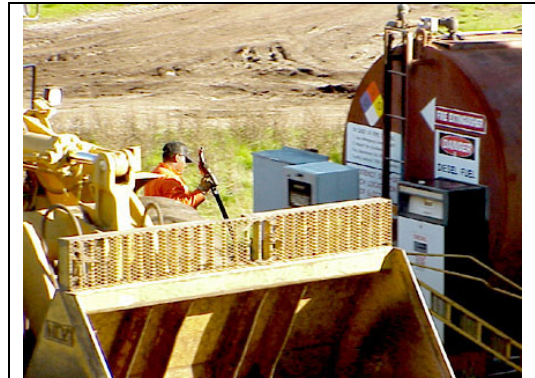
## **City of Palo Alto Pilots Biodiesel Fuel at Landfill and Golf Course**

*Source: City of Palo Alto*

### **Introduction**

Biodiesel is like diesel fuel except it is produced from natural renewable resources—vegetable oils, such as soy, canola, tallow and restaurant greases. There are two general categories of biodiesel use: 100% biodiesel (“B100”) and a blend of 20% biodiesel with 80% petroleum diesel (“B20”).

Biodiesel is currently more expensive than petroleum diesel. Some organizations are using B20 because it is much less expensive than B100. The cost differential between biodiesel and petroleum diesel is expected to decline within the next 5 years.



*City of Palo Alto staff person fueling landfill equipment with B20, the 20% biodiesel blend*

### **Benefits of Biodiesel**

Made from cooking oils and alcohol, biodiesel is biodegradable and very safe to handle. Biodiesel has a high flashpoint of about 300°F, compared to petroleum diesel’s flashpoint of 125°F. If biodiesel spills on the ground, it will quickly degrade into natural organic residues.

The use of biodiesel can extend the life of diesel engines because it is more lubricating than petroleum diesel fuel. Biodiesel is 11% oxygen, which means that even in a blend such as B20, the oxygen content assists in the combustion of the hydrocarbons.

Biodiesel reduces air pollution and reduces greenhouse gas emissions. The exhaust from biodiesel smells much better than diesel exhaust. The table below presents the emission differences of B100 and B20 relative to diesel. Because there is no sulfur in biodiesel, it does not contribute to sulfur dioxide emissions. B20 provides about 20% of the benefits of pure biodiesel. B20 can also reduce the soot and smell of diesel exhaust.

#### **Biodiesel Fuel Combustion Pollutant Emissions**

<b>Emission</b>	<b>B100</b>	<b>B20</b>
Carbon monoxide	-43.2%	-12.6%
Hydrocarbons	-56.3%	-11.0%
Particulates	-55.4%	-18.0%
Nitrous oxides	+5.8%	+1.2%
Air toxics	-60 to 90%	-12 to 20%
Mutagenicity	-80 to 90%	-20%

(From “Biodiesel for the Global Environment” produced by the Dept. of Energy, May 2000.)

### **Palo Alto’s Program**

In Summer 2001, Palo Alto began piloting the use of B20 in heavy equipment at the City’s landfill. Prior to filling the landfill’s 5,000-gallon aboveground diesel fuel storage tank with biodiesel, the tank was completely drained. After draining, a person entered

the tank to scrape, brush and wash collected deposits and sludge from the interior. This step is necessary because biodiesel is a more aggressive solvent than is petroleum-based diesel, and it tends to loosen deposits from the interior of fuel tanks and lines. In addition to cleaning the main storage tank, the fuel filters on each piece of equipment were changed twice over a period of two to three weeks. These filter changes are required to prevent the filter(s) from plugging with debris that can be suddenly loosened from the vehicle's fuel tank and fuel lines. The cost of cleaning the main storage tank and replacing the fuel filters on six pieces of equipment was approximately \$5,000.

In the summer of 2002, City's street sweepers will begin using the B20 blend. In order to help expedite this change, biodiesel fuel will be made available at the Golf Course fueling facility, following the same procedure that was used at the landfill. After the City's new main fleet fueling facility is completed (summer 2003), all of the remaining diesel fueled fleet vehicles will be "converted" to run on biodiesel. The new fueling facility will include two separate diesel storage and dispensing systems, so that both regular diesel and biodiesel will be available until the biodiesel conversion program is complete. All vehicles (with the exception of brand-new units) require some degree of work to "convert" them to run on biodiesel. The "conversion" process consists of evaluating a vehicle to determine if the fuel system is fully compatible with biodiesel fuel, changing seals and fuel lines if necessary, and performing several fuel filter changes over a period of two to three weeks (as noted in the above paragraph). Even with these precautions, problems may still occur. Given the amount of work and monitoring required, it is not practical to make a fleet wide conversion to biodiesel all at once. The conversion must be phased in over a period of several months.

Standby generators will also be included in the conversion program, although these are lower priority because of their relatively infrequent usage.

### Issues

During program start-up the primary issues for Palo Alto were cost, availability, cleaning of storage tanks, and the effect of the product on the engine seals (biodiesel can degrade rubber seals).

- Availability: At the time Palo Alto made the decision to pilot the use of biodiesel, Olympian Oil (San Francisco) was the exclusive distributor of biodiesel in Northern California. Although Palo Alto does not purchase fuel from Olympian, it was able to persuade its current fuel vendor (Valley Oil) to purchase B100 biodiesel from Olympian. Valley performs the blending (to B20) on site.
- Tank Cleaning: Most large service-station maintenance contractors provide this service. Palo Alto's current contractor is Petrotek, Incorporated.
- Engine Seals: Compatibility with engine seals and fuel lines was confirmed with equipment manufacturers. Most equipment manufactured after 1990 can use biodiesel without modification.

### Project Costs

Biodiesel is currently more expensive than petroleum-based diesel. Palo Alto and other organizations are using B20 because it is less expensive than B100. The B20 blended

fuel costs about 4 to 6 cents more per gallon than traditional diesel fuel. The cost differential between biodiesel and petroleum diesel may decrease within the next 5 years.

#### Evaluation Data

Reliance on traditional diesel is among the City of Palo Alto's metrics for evaluating the reduction of dioxin and other air pollutants in its community. The table below presents the diesel purchases in 2000 (baseline) and 2001. The biodiesel purchased in 2001 began in summer 2001 and consisted of 20% biodiesel blended with traditional diesel. Assuming the biodiesel continues to perform well and that the biodiesel costs decrease, this metric should continue to show increased use of biodiesel.

#### **City of Palo Alto Purchases of Diesel and B20 (20% Biodiesel, 80% Diesel)**

<b>Year</b>	<b>Diesel (gal)</b>	<b>B20 Blend (gal)</b>
2000	137,132	0
2001	142,189	5,593

#### Future Plans for Biodiesel in Palo Alto

B20 will be used as long as it is economically viable, and the emissions reductions are competitive with the emissions reductions achievable with other fuels, such as ultra-low sulfur diesel. B100 is not currently being considered, due to the prohibitive cost (more than \$3.00 per gallon). However, if the price of B100 decreases significantly, a limited B100 pilot program may be implemented.

#### Contact Information

Keith LaHaie, Fleet Manager, City of Palo Alto  
Email: keith\_lahaie@city.palo-alto.ca.us  
Phone: 650-496-6948



## **Port of Oakland Vision 2000 Maritime Development Program – Air Quality**

*Source: Port of Oakland*

### **Overview**

On April 20, 1999, the Port of Oakland approved spending \$8.9 million in air quality mitigation projects. This Program is known as the Vision 2000 Air Quality Mitigation Program (V2K AQMP). Nineteen air quality improvement programs and projects have been adopted by the Port of Oakland. These include:

- Subsidizing the cost of repowering and retrofitting diesel truck engines;
- Implementing a demonstration project installing add-on emission control devices on local trucks;
- Funding the engine replacement and equipment retrofit on container terminal equipment (“Container Terminal Equipment Repower and Retrofit Program”)
- Repowering one tugboat with low-emission diesel engines as a demonstration project.
- Subsidizing the replacement of twenty-seven two-stroke diesel engines in local transit buses with new, low-emission diesel engines equipped with diesel particulate traps.
- Funding an engineering study to determine whether cost-effective measures exist to control volatile organic carbon emissions at a local metal casting plant.
- Other measures, such as designing tugboat wharves to enable “cold ironing”.

The Vision 2000 Air Quality Mitigation Program comprises four phases:

- In Phase I (April 1999 to November 2000), the Port devoted resources to refining its overall strategic approach to the program, building advanced technical knowledge and expertise, designing specific implementation procedures for individual mitigation measures and implementing and reporting on specific measures.
- Phase II of the program (December 2000 to April 2002) will be characterized by continued implementation of program components. Concurrently, Port environmental staff anticipate assessing the performance of Phase I of the program. The evaluation will be used to guide modifications to the entire program, including strategic approaches, procedures and future projects.
- In Phases III and IV (April 2002 to April 2005) coincident with completion of the Vision 2000 Maritime Development Program, the Port intends to implement any outstanding mitigation elements. The Port anticipates that most of the principal measures will have been fully implemented by then.

### **Goals And Objectives Of The Vision 2000 Air Quality Mitigation Program**

The overall goal of the Vision 2000 Air Quality Mitigation Program is “maximize the quantity of emissions reduced for the dollars spent, with a preference for reducing diesel particulates (PM) and for measures that will reduce local near-Port emissions” (Resolution # 99153). Additional program goals are:

- Improved tenant relations.
- Improved worker health and safety.
- Improved community quality of life.
- Foster the installation of the most advanced emission control technologies for maximum air emission reductions.

For more information please contact Mr. Harold Jones, Manager Governmental Affairs at (510) 627-1564; Mr. Richard Sinkoff, Port Environmental Assessment Supervisor at (510) 627-1182, and Marucia Britto, Port Environmental Planner at (510) 627-1104.

### Project Facts

#### Transit Bus Repower And Retrofit Program

- On December 16, 1999, the Port paid \$659,124 to the Alameda-Contra Costa Transit District (AC Transit) to “jump-start” its on-going bus repower and retrofit program.
- The grant subsidizes the replacement of two-stroke engines with new, low-emission diesel engines on 27 AC Transit buses.
- Additionally, the buses will be equipped with catalytic soot filters.
- After full implementation, the project will reduce nitrogen oxides by 39.7 tons and particulate matter by 3.9 tons.
- The project immediately reduces emissions caused by AC Transit buses until more advanced technology, such as hybrid-electric and fuel-cell powered transit buses become economically and technically feasible.
- To date, seven buses have been repowered and retrofitted. Five are currently being repowered.

#### Tugboat Repower Project

- The Port created an incentive based funding program to repower and/or retrofit one or more tugboats that provide services to Port tenants.
- On July 18, 2000, the Board of Port Commissioners approved funding the engine replacements of two 2-stroke diesel engines with two modern, electronically controlled, low-emission marine diesel engines.
- The Port’s funding of \$408,300 covers half of the cost of purchase and installation of these engines.
- The projected emission reductions are 0.9 tons particulate matter and 26 tons nitrogen oxides per year.
- The overall emission reduction over the project lifetime (16.5 years) will be 15.5 tons of particulate matter and 431 tons of nitrogen oxides.

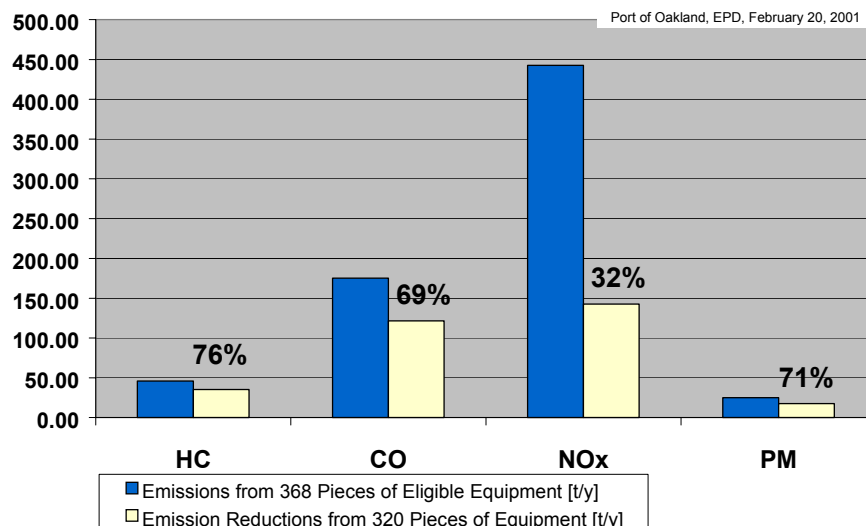
#### Container Terminal Equipment Repower and Retrofit Program

- The Port created an incentive based grant program, the Container Terminal Equipment Repower and Retrofit Program (CTERRP) that provides funding for

engine replacements and installation of emission control technologies on maximum 368 pieces of container handling equipment.

- All marine terminal operators at the Port of Oakland submitted funding applications in December 2000. The grant agreements are currently being signed.
- Marine terminal operators (MTO) propose to repower more than 150 pieces of equipment with new, low-emission diesel engines.
- Additionally, MTO applied for funding to install approximately 150 diesel oxidation catalysts and 150 diesel particulate filters. Fifty percent of the MTO propose to start using ultra-low-sulfur diesel in year 2000.
- With full implementation of Tier 1, the CTERRP will reduce particulate matter emissions from all eligible pieces of equipment by over 70%.
- Nitrogen oxides will be reduced by over 30%. This reduction is mostly related to engine replacements.
- Hydrocarbons, many of which are toxic or carcinogenic, will be reduced by nearly 80%.
- This represents a reduction of 60 tons of particulate matter, more than 470 tons of nitrogen oxides and more than 150 tons of hydrocarbons over the project lifetime.
- The Port will have submitted grants under Tier 1 in the amount of approximately \$3.5 million in order to achieve the projected emission reductions.

**CTERRP**  
**Proposed Emission Reduction of All Eligible Equipment**



# Fact Sheet

## SFO's Commitment to Clean Air Vehicles

San Francisco International Airport adopted a Clean Air Vehicle Policy in February 2000. The policy mandates the replacement of traditionally fueled vehicles with clean air vehicles that use alternative fuels such as Compressed Natural Gas (CNG), electricity and biofuel. Aggressive target dates are set for the clean vehicle transition. Where manufacturers offer competitive alternative fuel products, 50 percent of the vehicles operated or permitted by the Airport should use clean power by 2005, and 100 percent by 2012.

SFO is achieving the clean vehicle transition in several ways. The Airport pursues funding opportunities, including a \$2 million FAA grant to enhance clean air vehicle acquisition, primarily on the airfield. SFO received another \$2 million from the Bay Area Air Quality Management District for on-road vehicle incentives. The Airport also employs financial and non-financial incentives to encourage the use of alternative fuels by fleet operators including preferential trip fees and "head of the line" privileges for CNG taxicabs. In order to service alternative fuel vehicles, the Airport established the largest public CNG fueling station in Northern California, and is adding a second station.

### AirTrain

On March 3, 2003 SFO began operation of AirTrain, an automated people mover linking the Airport's terminals, parking garages and rental car center. AirTrain replaces the Airport's rental car shuttle buses, which operated a total of almost 600 round trips per day. AirTrain, powered by hydro electricity, eliminates all emissions for these trips.

### Compressed Natural Gas (CNG)

The majority of on-road alternative fuel vehicles at the Airport operate on Compressed Natural Gas (CNG). In response to the transition to CNG, SFO established the largest public access CNG station in Northern California. At this facility, natural gas obtained from an underground pipeline is compressed to 4,500 pounds per square inch. The facility features 8 fast fill hoses which currently supply 70,000 equivalent gallons of CNG per month to customers. The station is operated under lease by Trillium USA, and contributes income to the Airport. A second CNG station operated by ENRG begins service in Fall 2003.

### Electric Vehicles: The Greening of the Airfield

SFO's clean air vehicle policy extends to vehicles and equipment used on the airfield. The move to electrify Ground Service Equipment started more than a decade ago. Today, about 25% of all Ground Service Equipment uses clean power, and the percentage is steadily growing.

### Hybrid-Electric

Budget Rent-A-Car is renting state-of-the-art Honda Civics, Insights, and the Toyota Prius at SFO.

## **Biofuel**

In April 2001, SFO successfully operated diesel-engined parking and rental car shuttle buses on 100% soy-derived biofuel. SFO is prepared to use biofuel in diesel engines on a regular basis, should the price to the Airport be competitive with diesel.

## **Estimated Emissions Reductions from Clean Air Vehicles**

The use of clean air vehicles substantially reduces traditional vehicle emissions. The estimated lifetime emission reductions of untracked clean air vehicles (excludes AirTrain) in service at SFO by 2005 compared to traditional fuel vehicles (gasoline or diesel) are as follows:

- Nitrous Oxides: 1,100 tons
- Hydrocarbons: 200 tons
- Carbon Monoxide: 2,900 tons

## **Clean Fuel Vehicle Count**

Natural gas, propane, and electric vehicles in operation at SFO as of mid 2003:

- 4 full size buses
- 33 heavy-duty buses
- 25 medium-duty buses
- 100 vans
- 50 staff pickup trucks and autos
- 80 taxicabs
- 60 rental cars
- 300 airfield vehicles

## **CNG Station Statistics:**

Fast Flow Fuel Pumps: 8

Current CNG  
demand per month: 70,000 gge

Fuel demand by operator type:

- 31% door-to-door vans
- 32% hotel courtesy shuttles
- 13% taxicabs
- 12% off-Airport parking vehicles
- 4% Airport staff vehicles and shuttles
- 8% other





# Regulated Medical Waste Reduction

## 10 Steps to Implementing a Regulated Medical Waste Reduction Plan

Hospitals are saving hundreds of thousands of dollars by improving their waste segregation and implementing Regulated Medical Waste (RMW) reduction programs. RMW is often the most expensive waste stream to manage. While the primary objective of RMW management is to minimize the risk of disease transmission from handling RMW, every facility has an opportunity to reduce its RMW thereby reducing risk *and* cost.

Many hospitals routinely throw from 50-70% of their waste into the biohazardous waste stream, although a large portion of hospital waste is very similar to that of a hotel or office building—mostly paper, cardboard and food waste. Hospitals often pay up to 10 times as much to dispose of infectious versus solid waste. Case studies prove that with comprehensive education, hospitals can realistically aim to decrease red bag waste to a mere 6-10% of their waste stream. In fact, the Centers for Disease Control (CDC) suggests that only 2-3% of hospital waste truly needs to be disposed of as infectious waste.

The tremendous opportunities for cost and volume reductions do not come from the “gray areas” where it is difficult to determine whether the item is “significantly contaminated” or not. Staff should ask the question whether the waste is potentially infectious (see definition below) and should know which container to throw the waste in- a red bag, clear bag or in a recycling container. If staff is not clear on where to throw the item, then they should err on the conservative side and dispose of it in a red bag. The significant opportunities for RMW reduction come from eliminating the coffee cups, packaging, paper towel waste, clean blue wrap and pizza boxes that get tossed in! To help you get started in implementing a Regulated Medical Waste (RMW) Reduction Plan, H2E recommends the following ten-step process.

### Step 1: Understand Regulated Medical Waste Definitions

Review your facility’s policies, procedures and definitions for RMW handling and disposal. Check with your state regulatory authorities to make sure you understand state specific regulations. Meet with your Infection Control Staff to refine and clarify your facility’s guidelines. A strong partnership with Infection Control will help ensure a successful program. Include RMW reduction information and goals in your Bloodborne Pathogens Exposure Control Manual.

Proper waste segregation is critical. RMW, sharps, recyclables and solid waste should each have separate containers that are clearly labeled and easily accessible. Hazardous chemicals must be stored and managed according to policies that conform to RCRA regulations. It sounds simple, but staff must be properly trained to understand which waste is placed in which container.

Liquid wastes present yet another unique disposal question. Are you pouring your liquid waste down the drain? Are you containerizing it or adding gelling agents, then disposing of it in red bags? Removing liquids can often cut your infectious waste stream in half, but must be done carefully. There are now several products available to mechanically manage liquid waste disposal. Review your facility’s protocols and OSHA guidelines for managing liquid infectious waste and work with your local POTW and state regulatory officials to determine your best disposal options.

## OSHA's Definition of Regulated Waste:

Regulated Waste means liquid or semi-liquid blood or *other potentially infectious materials* (defined below); contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

*Other Potentially Infectious Materials* means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

*Beth Israel Medical Center in New York City, implemented an aggressive RMW reduction program and continues to save over \$800,000 per year in waste disposal costs.*

### More information:

- Infectious Waste Management Section of the H2E website  
[www.h2e-online.org/tools/waste-inf.htm](http://www.h2e-online.org/tools/waste-inf.htm)
- H2E Waste Minimization Guide: Section VII More About Regulated Medical Waste  
[www.h2e-online.org/tools/guide.htm](http://www.h2e-online.org/tools/guide.htm)
- Medical Waste - [www.epa.gov/epaoswer/other/medical/index.htm](http://www.epa.gov/epaoswer/other/medical/index.htm) .

## Step 2: Define the Problem and Develop a Cost/Benefit Analysis

First you need to understand your true waste costs and potential savings by identifying:

### How much RMW are you generating?

What percentage of your total waste is RMW? Industry guidelines recommend that only 6-15% of your total waste should be going into RMW containers. You need to determine what portion of your waste is currently being disposed of as RMW. This will help you identify how much of an opportunity you have to reduce your volume and your disposal costs. Collect data from your waste hauling invoices or manifests. If you are billed by the box or other container, calculate the average weight to determine total weight. \*Remember to subtract the weight of the disposal container and bags to calculate the actual weight of the RMW. Use H2E's Annual Facility Summary and Goals Form to record your current RMW numbers.

### What are your total disposal costs?

Understanding your total disposal costs and your opportunities for cost savings is a powerful tool to not only get support from administration but also from staff. Does your staff realize that your facility pays approximately 10 times more for RMW disposal than solid waste disposal? Tell them! Your current disposal costs can be used as your baseline data— you will use these numbers to compare after you implement your RMW reduction program.

### What are your potential savings?

Use the RMW Cost Benefit Worksheet (Excel spreadsheet) available on H2E's website to help you determine the potential for savings. When you present the program to administration, present cost savings first, but remember to include the other benefits of a RMW reduction program such as employee morale, improved safety implications, community and public relations.

More information:

- RMW Cost Benefit Worksheet (Excel spreadsheet)  
[www.h2e-online.org/pubs/WasteMgtTemplate.xls](http://www.h2e-online.org/pubs/WasteMgtTemplate.xls)
- Volume-to-Weight Conversion Table (click on Appendix D)  
[www.epa.gov/epaoswer/nonhw/muncpl/pubs/red2.pdf](http://www.epa.gov/epaoswer/nonhw/muncpl/pubs/red2.pdf)
- H2E Annual Facility Summary and Goals Form - [www.h2e-online.org/pubs/goalform.doc](http://www.h2e-online.org/pubs/goalform.doc)

### Step 3: Create a Team to Develop Goals and an Action Plan

With a good understanding of the amount of RMW your facility currently generates, the cost of disposal and a cost/benefit analysis, you are ready to develop your reduction program's goals and action plan. For optimal results, create a diverse team that includes staff from Housekeeping, Infection Control, Nursing, Safety, Facilities, Education, Purchasing, Laboratory, and clinicians-- particularly those from the OR, ED and critical care areas. Be sure to establish and highlight management commitment to the effort.

It is important that the team share a common understanding of the goals. Make goals measurable and practical. A first step is to review the processes that are generating the most RMW. These areas should be targeted first. A written action plan will help team members stay focused on the steps necessary to achieve your goals and implement your RMW reduction program. Goals should include health and safety, cost reduction, and pollution abatement considerations. Delegate a leader to take responsibility for meeting each of the project goals identified. Each area of the hospital (i.e. different units/floors/specialties) should have a designated point person to whom team members can communicate with about goals and accountability for that unit's performance and waste generation rates. While the work is not difficult, it requires perseverance, accountability and an ongoing commitment.

Consider benchmarking your goal with a standard for your size and type of facility (for example, 4.5 pounds of RMW per adjusted patient day). Often facilities will try to achieve an (X) percent reduction in targeted areas. Graph your RMW reduction progress.

More information:

- H2E Self-Assessment Guide & Worksheets, Section 4 - [www.h2e-online.org/pubs/selfasmt.pdf](http://www.h2e-online.org/pubs/selfasmt.pdf).

### Step 4: Planning for Waste Segregation

Proper waste segregation is critical to any waste reduction effort. Provide the proper tools for employees to easily implement waste segregation. Once you make it easy for staff to properly segregate waste, you will end up with less misplaced waste in your red bags.

- First, work with department heads and nurse managers in each area to determine the types and volumes of wastes generated. This will help you determine their container needs. For example, an oncology unit may have a greater need for chemotherapy containers, while a dialysis unit may need more recycling bins for plastic dialysate bottles.
- It is important to stress the agreed upon definition of RMW. Working with clinicians to eliminate bad or outdated disposal habits is a challenge. Have a good policy and a clear definition of what Regulated Medical Waste means in your facility.
- Survey the facility to determine real waste needs- are there too many red bags available? If red bags are too easily accessible, clinicians and patients tend to dispose of regular waste in an RMW container. Prepare to remove red bag waste containers from sinks and other areas where the likelihood of RMW generation is low – this may include exam rooms and patient rooms.
- Purchase new containers and/or signage depending upon the required changes in your facility. Size the container for the appropriate amount of waste generated. Typically, the smaller the container, the less likely clinicians will be to throw extraneous items into it. Small, X gallon containers with step-on lids work well. Containers should be color coded or at least consistently labeled throughout the institution.

## Step 5: Container Placement and Signage

Proper container placement and signage is key to the success of any waste segregation program. Proper signage and labeling provides instructions and on-the-spot education. All RMW containers should display the biohazard label.

- Red bag containers should be covered to reduce solid waste that is casually tossed in.
- Develop a sign to post above or on red bag containers, outlining what types of waste are to be disposed of as RMW. Do the same for sharps, hazardous waste, and other types of waste containers. The signs should use a large font and bullet type format, preferably in color, so they are easy to read and understand at a glance. Have the signs made into labels to easily affix to waste containers. And remember to use **multiple languages** if necessary for optimal communication.
- Remove red bags from underneath sinks, non-critical care patient areas, hallways and other areas where people are likely to dispose of their solid waste in RMW containers.
- Where there are infectious waste containers, locate regular waste containers directly adjacent, to ensure that employees are making a conscious disposal and segregation decision.
- Consider posting a letter signed by your CEO outlining your facility's commitment to waste minimization.

In the laboratories, a team approach should be used to go through the materials discarded to determine which types of items go in a red bag, clear bag or sharps container. Then develop appropriate signage for labs.

More information:

- California Integrated Waste Management Board RMW posters  
[www.ciwmb.ca.gov/BizWaste/Posters/RedBag.htm](http://www.ciwmb.ca.gov/BizWaste/Posters/RedBag.htm)
- Virginia Department of Environmental Quality RMW posters - [www.deq.state.va.us/p2/vh2e](http://www.deq.state.va.us/p2/vh2e)
- Going Green - [www.h2e-online.org/tools/waste.htm](http://www.h2e-online.org/tools/waste.htm)

*In the OR, one tip to reduce RMW is to line the red bag with a clear bag. This allows all of the packaging, blue wrap and other material generated by OR packs to be thrown into a clear bag. After all-- this is a sterile environment where there is little to no possibility of infectious materials being generated. Pull the clear bag immediately before the patient enters the room. True infectious waste can then be placed in the red bag without all of the solid waste commingled.*

## Step 6: Worker Training and Education Plans and Policies

Training is the key to success in a red bag reduction program. Staff need clear, coherent information to understand the reasons for proper segregation: **regulations, cost implications, and environmental leadership.**

- Train new employees on their first day as part of orientation. Include your facility's commitment to compliance, good segregation practices, and stewardship (policy statement). Staff should understand that improper disposal of their waste has potentially serious safety threats to waste haulers and increased liability for the hospital. Make it clear to them that it is part of their job to manage waste safely. Consider making "compliance with hospital waste management policies" a part of every job description.

- Re-train current staff with agreed upon definition of RMW. Inform staff about the facility's RMW reduction goals. Improved awareness leads to good segregation practices, which reduces the risk to the environment, reduces the risk to the hospital, and fosters a safer work environment. Fewer needle sticks, fewer spills, the less hazardous chemicals used and the more RMW properly disposed of, all generate cost-savings for your facility.
- Work with your CEO/administration to hold department heads accountable for their RMW generation and associated disposal costs, and make these numbers a part of their annual review. This must include the OR, which typically generates the most RMW in the entire hospital. Develop incentives for the department heads to work toward.
- Take every opportunity to educate staff. Annual in-services ensure continuous quality improvement. Annual in-services also reinforce the facility's definition of RMW and its relationship to volume reduction. Documenting this training can be used to meet the new DOT training requirements as well as to satisfy OSHA's current training requirements.

*Make sure the following items don't end up in an RMW container:*

- |                     |                     |
|---------------------|---------------------|
| ■ Product packaging | ■ Gloves and gowns  |
| ■ Office paper      | ■ Linens            |
| ■ Paper towels      | ■ Diapers           |
| ■ Batteries         | ■ Waste medications |

### Step 7: Sharps Management

Does your facility have a problem with needle sticks or sharps injuries due to improper waste handling? Are you spending an excessive amount on sharps containers relative to your patient activity? More than likely you have a sharps management policy but there are opportunities to reduce your sharps container usage.

- Train staff not only on the imperative to dispose of sharps and other potentially sharp items in the proper container, but also on what does not belong in sharps containers: gauze and bandages, tubing, empty, unbroken vials, mercury thermometers and other non-infectious, non-sharp materials.
- While safety is the priority, assess opportunities to maximize container use by optimizing when they are replaced. (i.e., unnecessarily removing half full or less containers or filling them with inappropriate wastes generates more sharps waste than necessary).
- Consider using a reusable sharps container system if a hauler is available in your area. Typically this saves money, can reduce worker exposure and handling, and can significantly improve environmental impacts.

### Step 8: Problem Identification and Resolution Plan

You will encounter waste disposal issues: you will find infectious waste in the regular trash and perhaps even sharps in regulated RMW. Have a plan of action to resolve problems. Administration needs to support the plan and the staff person assigned to play "cop." If problems are not addressed quickly and adequately resolved, they will persist and increase.



Conduct a tour of your trash areas monthly. Develop a mechanism to report concerns or problems and appropriate solutions back to all staff. For example, document each waste-generating area with a photograph and catalogue them according to department or floor and responsible party. Education and feedback communicated via e-mail to departmental contacts using photos works best. Conduct in-service training for units that are not following through with the program. Engaging a nurse leader to help communicate the new program is often very effective.

### Step 9: Waste Treatment and Waste Hauling

A big benefit to an RMW reduction plan is that it reduces the amount of waste that requires treatment, which not only saves money, but also minimizes environmental impacts. Understand how your waste is being treated, and consider your treatment technologies. Given the adverse impacts of incineration on public health and the environment, explore your opportunities for minimizing incineration- for both solid (municipal) and infectious waste. Some haulers have the option of providing both non-incineration and incineration technologies. Make sure your solid waste is being landfilled rather than incinerated.

General infectious waste requires treatment, but not necessarily incineration. Pathological and trace chemotherapy wastes are the only wastes that some states require to be incinerated. Consider an aggressive source segregation and minimization plan for those waste streams. Note that some bulk chemotherapy waste will need to be handled as hazardous waste (P and U-listed RCRA wastes).

Develop a good working relationship with anyone handling your waste – this includes everyone from the housekeepers, to your RMW and solid waste haulers, to waste transfer stations, to the landfill operators. You should do site visits to every facility where the waste is sent. They should all understand your commitments to your waste management plan and ideally- share your definition for what is defined as 'true' RMW.

More information:

■ Non-Incineration Medical Waste Treatment Technologies - [www.noharm.org/nonincineration](http://www.noharm.org/nonincineration)

*Edith Nourse Rogers Memorial Veterans Hospital  
in Massachusetts has lowered their RMW to an  
impressive 6 percent of their total waste stream.*

### Step 10: Track Your Progress, Report Successes and Reward Staff!

A successful, sustainable program needs a leader, good tracking and reporting, and sustained vigilance. To realize the full benefits, track and celebrate the positive changes in your waste volumes (reduced RMW and increased recycling) and your cost-savings. Let the community know about your successes and the positive effects your efforts are having on the environment and community health. Hospital administrators should know about the cost-savings your RMW reduction program is generating- these savings are often significant. Write a case study of project results to share with community newspapers, state and federal agencies, and publish them on your hospital's website. Even better, apply for an H2E Award and get local and national recognition for your hard work!

Reward staff for their efforts and encourage continued participation in your RMW reduction program.

A change in work habits takes a commitment and deserves recognition. Consider doing something creative with a percentage of savings to recognize staff for their efforts. Rewards help to reinforce good work habits, including proper waste segregation and disposal practices. Examples of some easy to implement rewards include movie tickets, or arranging for a catered lunch (something simple like pizza is appreciated) for the area/group with the largest waste reductions.





## Case Study on Catholic Healthcare West Hospital System: Environmentally Responsible Principles in Practice

Emerging as a national leader for providing environmentally responsible healthcare, Catholic Healthcare West, CHW, the largest not-for-profit health care system in the western United States, is a 2002 recipient of Hospitals for a Healthy Environment's Champions for Change Award. In 1996, Catholic Healthcare West became the first health care system to endorse the principles of the Coalition for Environmentally Responsible Economies (CERES), an effort joining investor, environmental, and advocacy groups to promote a sustainable future. In endorsing the principles of the CERES agreement, CHW embarked on environmental practices of waste reduction, recycling, and Environmentally Preferable Purchasing (EPP) that have become an integral part of its operation in promoting healthy communities.

The CERES agreement calls for its member institutions to adopt policies that will protect the biosphere, use natural resources in a sustainable manner, reduce and properly dispose of wastes, conserve energy, reduce risks at facilities, and use safe products and services. Additionally, members are called to restore the environment when necessary, inform the public of risks posed by institution activities, provide annual reports and audits, and sustain a management commitment.

To ensure adherence to CERES goals, each hospital in the CHW system created an Environmental Action Committee (EAC) to coordinate hospital wide environmental policies and oversee comprehensive environmental health and safety programs. EACs also determine the effectiveness of implemented programs through monitoring and tracking. In addition to adopting CHW's system wide environmental initiatives, these committees institute innovative programs at the individual hospital level.

In an effort to protect the biosphere, CHW is taking steps to stop harmful gas emissions. Facilities installed modernized chillers and boilers and replaced older model ETO sterilizers with either units that substitute HCFCs for CFCs or those that do not require a propellant. Of the few ETO sterilizers still remaining all are now modified to capture 99% of ODC leakage, which is then recycled. Taking a leadership role in CHW's development of cleaner fuels, Marion Medical Center is pioneering research on a methane fuel system. Additionally, many of the hospitals within CHW reduced fuel emissions through formal car-pool programs, public transportation subsidies for employees, and agreements with vendors that result in reduced trips and vehicular mileage.

Many CHW hospitals recently adopted a mopless cleaning system. Not only does this reduce the amount of chemicals required for cleansing, it also reduces the volume of water used. This more efficient allocation of natural resources saves the hospitals (amount of money). Mercy Medical Center designed a unique program of recycling its cooling water to support a hospital created wetlands, which improves the health of migrating waterfowl and serves as a therapeutic walking ground for the Center's patients. One of the focal points of CHW's environmental program is its commitment to reducing wastes through both recycling and other waste reduction initiatives. In addition to the use of a system wide recycling program on all recyclable materials, including medical, industrial, and hazardous waste recycling, and a reuse program on items from surgical tool wraps to Styrofoam, CHW uses a quarterly reporting tool to achieve goals of reducing solid waste disposal by 10%, medical waste disposal by 20%, and increase recycling by 10% (timeframe?). Individual hospitals must report their waste disposal each quarter and seek to reduce it and achieve CHW goals through various means. For example, St. Mary's Medical Center in San Francisco reduced hazardous waste by 90% (timeframe?) by changing processes (details?) and identifying non-hazardous substitutes for previously used chemicals (such as?). By recycling 167 tons of waste, the San Joaquin Region reduced its solid waste volume by 13%. CHW also achieved waste reduction success through improved packaging, including sending multiple shipments in one container as is done at St. Vincent's Medical Center and by requiring vendors to reuse pallets for deliver at St. Francis Memorial Hospital of San Francisco.

Other hospitals report various successes as well. Since 2001, Dominican Hospital's Blue Sterile Wrap Recovery Program collected and sent over 9000 lbs of Blue Sterile Wrap and other plastics to Marathon Recovery, a plastic collection firm. Marathon Recovery then melts the plastic and uses it as glue for an urban wood/plastic composite building material. Marion Medical Center began a Greenwaste Recycling program for its community. MMC sends waste for composting and then farmers use it in agricultural fields, resulting in less need for water, fertilizers and pesticides. In the past year, the hospital diverted 25,500 lbs. of greenwaste from the landfill and sent it for composting. A waste segregation training program at Dominican Hospital Santa Cruz lead to a reduction in medical waste from 3 lbs. per patient adjusted day to just 1.35 lbs. Since its implementation in (date) the program diverted 300,000 lbs. of

medical waste from the disposal stream and achieved \$130,000 in savings. Finally, to ensure usable materials are not wasted, CHW sends excess medical equipment to developing countries.

Conservation of energy is a CERES principle from which several CHW hospitals benefit. St. John's Regional Medical Center reduced its energy consumption by 8% (over what period) through a lighting upgrade program that replaced existing ballasts with energy efficient ballasts and lamps. Seton Medical Center performed a similar upgrade and realized \$36,000 in savings related to reduced consumption.

To reduce risks to both employees and the community at large, CHW conducts Employee Education Programs. Newsletters, bulletin boards, staff meetings, and safety fairs educate employees on healthcare related environmental issues and hospital policies and programs. Such education safeguards the health of employees and encourages them to use their knowledge to correct environmental deficiencies for the benefit of the community.

Another strength of CHW's environmental program is its recognition of the importance of utilizing safe and environmentally preferable products. This past year Catholic Healthcare West issued environmental purchasing guidelines in pursuit of three goals: to reduce waste at its source by reducing the amount of virgin materials purchased, to purchase goods with recycled content that can be recycled again, and at the end of initial use focus on recycling, reuse within the hospital or elsewhere, and proper disposal. As part of its Environmentally Preferable Purchasing (EPP) efforts, CHW established Value Analysis Committees at the corporate and local levels to analyze products and make purchasing decisions. Furthermore, CHW entered a contract agreeing that medical supplier Premier will provide over 60% of its purchasing needs. CHW informed Premier of its commitment to the environment and its desire to purchase environmentally friendly materials. The hospital system is also nearly 100% mercury free and committed to purchase mercury free products unless no viable alternative is available. Furthermore, CHW often participates in conferences to continually share and gain knowledge of EPP. The continuous and visible drive to improve their environmental performance and share their vision with others sets CHW apart as a national leader.

Using the CERES principles, Catholic Healthcare West developed an effective plan to protect the environment and improve the health of its communities. Through a combination of system wide policies instituting required programs and innovative programs developed at the hospital level, CHW proves it is

possible for a health system to use waste reduction, recycling, and purchasing decisions to provide environmentally sound health care.

## Environmentally Preferable Janitorial Paper Supplies in Alameda County

Good news! Environmentally friendly paper towels, bathroom tissue, paper napkins and facial tissue are readily available in Alameda County.

### What To Look For

**Quality, cost, and availability** are still primary considerations when making purchases. Adding environmental benefit considerations does not need to sacrifice other factors, and in fact, may reduce costs and improve performance.

#### **Environmental attributes to consider include:**



**Recycled Content** — Using recycled materials saves energy, water, and trees; reduces air, water and land pollution; and creates markets for papers collected in local office and community recycling programs.

**Postconsumer fiber content** is what really counts. Look for “postconsumer content” which meets or exceeds the following minimums used by federal agencies:

Paper Towels	40% postconsumer
Bathroom Tissue	20% postconsumer
Paper Napkins	30% postconsumer
Facial Tissue	10% postconsumer



**Processed Chlorine-free** — Many paper manufacturers use chlorine or chlorine derivatives to bleach paper. Byproducts from this bleaching process create dioxins, which cause health problems when released into the environment. Products can be bleached in processes that whiten them with chlorine-free chemicals. Recycled papers bleached with chlorine-free processes are sometimes described as being “Processed Chlorine-Free” (PCF) because, while the papers are manufactured without chlorine or chlorine derivatives, the fibers in the recycled pulp may have been originally bleached with chlorine.

The Bay Area Dioxins Project of the Association of Bay Area Governments is moving forward on purchasing policies for dioxins-free paper as one of its first 3 implementation projects. Go to [dioxin.abag.ca.gov](http://dioxin.abag.ca.gov) for information on

**Cooperative Purchasing Opportunities for Buying PCF Paper, Frequently Asked Questions in Getting Started on Chlorine-Free Paper Purchasing,** and additional information about dioxins and the Project.



**Unbleached** - Another alternative is to just not bleach the products. Personal hygiene papers such as bathroom tissue, facial tissue and sanitary products do not need to be bright white for use. Unbleached products are either brown in color or, if high in recycled content, off-white.

***Look for unbleached, natural color and processed chlorine-free (PCF) paper alternatives. Brightness, price and suitability are comparable to products bleached with standard chlorine-derived processes.***

## Performance, Cost and Ease

*"We like our recycled content paper towels and have had no complaints. They're soft and absorbent —so soft you can even wipe your eyes with them. They've been very well received."*

**Dorothy Killingsworth**

Manager, Janitorial Services

Alameda County General Services Agency

*"It was simple. The last time our janitorial contract was up for bid, we just stipulated in the bid document that we be provided with paper supplies that met or exceeded EPA guidelines. No extra cost or work on our part, and they bring the products to us!"*

**Judith Baker**

Harding ESE, Inc., Oakland

## Some Examples

Many janitorial products list their environmentally preferable qualities, but some don't. Some brands also make many different products, some with recycled content and some without. Ask specifically for the **highest postconsumer recycled content** available.

### Paper Towels



Envision Preference	40% postconsumer
Envision Acclaim	40% postconsumer
Second Nature	40% postconsumer
Comply	23% postconsumer
EcoSoft	40% postconsumer
Kleenex	40% postconsumer
Seventh Generation	80-100% postconsumer
Green Forest	10% postconsumer
Georgia Pacific	40% postconsumer
Marcal	40-60% postconsumer
Renature	80% postconsumer

### Bathroom Tissue



Marcal	100% recycled, 40% postconsumer
Marcal	60% postconsumer
Scott	20% postconsumer
Envision Preference	20% postconsumer
Envision Acclaim	20-25% postconsumer
EcoSoft	20% postconsumer
Seventh Generation	80% postconsumer
Green Forest	10% postconsumer
Earth Friendly	10-25% postconsumer
Natural Value	10-25% postconsumer
Renature	80% postconsumer
Advantage	25% postconsumer
Kimberly Clark	20% postconsumer



## Paper Napkins



Seventh Generation	80% postconsumer
Envision Preference	30-60% postconsumer
Envision Acclaim	30-60% postconsumer
Second Nature	40% postconsumer
Renature	80% postconsumer
Georgia Pacific	10% postconsumer
Marcal	40% postconsumer

## Facial Tissue



EcoSoft	20% postconsumer
Envision Preference	10-30% postconsumer
Envision Acclaim	10-30% postconsumer
Seventh Generation	80% postconsumer
Marcal	40% postconsumer
Renature	80% postconsumer

# Where To Find It in Alameda County

## Public Sector/ Commercial Purchasing

### Sampling of Vendors and Sources in Alameda County

This section is for governments and businesses, buying in large quantities, generally on contract from commercial paper vendors. There are often minimum order requirements. Start with your current supplier; most also have recycled content products. Ask vendors for samples. If janitorial services are contracted out, include environmentally preferable specifications/ requirements in bid and contract. Require winning contractor to provide environmentally preferable products. See a sample of specifications in the section below.

#### **A-C Paper Supply Co**

510/527-0841 (Berkeley)

[www.acpaper.com](http://www.acpaper.com)

*Envision (Acclaim), Second Nature*

#### **J.C. Paper**

510/568-6604 (Oakland store)

800/245-2650 (delivery)

[www.jcpaper.com](http://www.jcpaper.com)

*Envision (Acclaim)*

#### **Mountain Peoples Warehouse**

800/679-6733 (Auburn)

[www.mtnpeopleswhs.com](http://www.mtnpeopleswhs.com)

*Earth Friendly, Envision, Natural Value, Seventh Generation*

#### **Unisource Maintenance Supply Systems**

925/598-6400 (Pleasanton)

800/767-5677

*Comply, EcoSoft, Envision, Kleenex*

#### **Waxie - Cleaning Supplies and Equipment**

925/454-2900 (Livermore)

[www.waxie.com](http://www.waxie.com)

*Kimberly Clark, Georgia Pacific, and in-house brand*

#### **Xpedx - Packaging & Facility Supplies**

800/468-0204 (Hayward)

[www.xpedx.com](http://www.xpedx.com)

*Envision*

## Sample Specs and Bid Language

### Product Specific Performance Requirements

Green Seal, an independent non-profit product standards and certification program, offers this example of specifications for tissue paper:

Product must be made in accordance with reasonable industry practice with respect to holes, tears, wrinkles, cleanliness, foreign materials or dirt. It must have no disagreeable odor, either wet or dry, in accordance with reasonable industry practice. Edges of the product must be cleanly cut and not ragged. Product must dispense properly from the box or fixture.

Each roll of bathroom tissue must contain at least 40 square feet of product (equivalent to approximately 300 x 4.5 x 4.4 inch sheets). Each box of facial tissue must contain at least 70 square feet of product (equivalent to approximately 175 x 8.0 x 8.0 inch sheets).

### Product Specific Environmental Requirements

Examples of standards for products are offered below:

✓ **Bathroom Tissue:** the fiber in bathroom tissue shall contain at least 20% postconsumer materials.

✓ **Facial Tissue:** the fiber in facial tissue shall contain at least 10% postconsumer materials.

✓ **Paper Towels:** the fiber in paper towels shall contain at least 40% postconsumer materials.

✓ **Paper Napkins:** the fiber in paper napkins shall contain at least 30% postconsumer materials.

✓ **Postconsumer Content:** the postconsumer content of a product shall be determined by measuring the average product fiber utilization over a period of no longer than three months.

✓ **De-inking of Recovered Paper:** recovered paper shall not be de-inked using a solvent containing chlorine, or any chemicals listed by the EPA under Section 313 of the Emergency Planning and Community Right To Know Act.

✓ **Bleaching:** Chlorine and its derivatives shall not be used.

✓ **Additional Ingredients:** the product (not including packaging) shall not contain any added pigments, inks, dyes, or fragrances.

---

*There are many other examples from other businesses and federal, state and local governments. See the list of other resources to find more information.*



*For more detailed information about products and where to buy them in Alameda County, see **"Guide to Recycled Content Janitorial Paper Products in Alameda County"** at [www.stopwaste.org/buyrecycled.html](http://www.stopwaste.org/buyrecycled.html). Internet and catalog sources are also listed. The vendor and product information given here and on the website is provided so that suppliers can be contacted for further product inquiries, which is recommended.*

## Small Business/Consumer Purchasing

### Sampling of Vendors and Sources in Alameda County

This section is for buying in smaller quantities—directly from retail stores or office product catalogs. As with all products, there is a wide range of quality and cost. Shop around and try other options if one doesn't meet your needs. Typical consumer brands include Green Forest, Marcal, Earth Friendly, Natural Value, Seventh Generation, Second Nature, Envision, and EcoSoft (*partial list*).

#### Janitorial Supply Stores & Product Distributors

Cherrone Chemical (Hayward) 510/786-0656  
Keene Sanitary Supply (San Leandro) 510/632-3000  
Mission Peak Supply (Fremont) 510/651-2298  
Monahan Paper (Oakland) 510/835-4670  
Xpedx (Oakland) 510/839-8863

#### Office Supply Stores

Office Depot (several locations)  
Office Max (several locations)  
Sav-On Supplies (Dublin)

#### Grocery Stores

Andronico's (Berkeley - 3 locations)  
Berkeley Natural health food store  
Sundrop Health Foods (Pleasanton)  
Wild Oats natural food store (Berkeley)  
Whole Foods grocery stores (Berkeley, San Ramon)

## Tips To Save Money



- ✓ **Buy jumbo rolls** - reduces packaging, more can be packed in a carton, reduces labor costs, and people tend to use less.
- ✓ **Buy in bulk**, saving purchasing dollars and packaging waste.
- ✓ **Buy cooperatively** - check the “*Guide to Purchasing Recycled Products Cooperatively: Opportunities for Local Governments in Alameda County*” at [www.stopwaste.org/buyrecycled.html](http://www.stopwaste.org/buyrecycled.html)
- ✓ **Paper towels vs. other options** - evaluate the cost/benefit to your workplace to using air dryers or cloth towels.
- ✓ **Consider not using paper seat covers.**

## Steps for Success



Changing products and purchasing practices can take time. Businesses and governments that buy more environmentally friendly products have found that **including those who use the products in the decision-making process** and starting with pilot programs, **testing one or two products at a time** in specific applications, helped make it easier.

*The City of Fremont tested two brands of recycled paper towels in one building before making any changes. The building manager was concerned about quality, performance and "client" satisfaction. The two brands of towels were chosen from a list of a half dozen and the price was comparable, an overriding criteria. At the end of the test period, one towel clearly out-performed the other. The test was a success and useful in obtaining what the manager wanted — happy customers and a paper towel that cost less than the non-recycled brand.*

Remember, when you consider environmental attributes in purchasing decisions, you are helping save money, creating a safer and healthier environment and workplace, and closing the recycling loop by buying products made from the papers collected from office recycling programs!!

## More Resources

There are many, many resources available to help identify products and their performance, see sample bids and specifications, and read case studies of successful programs.

- ▲ **The Alameda County Waste Management Authority and Recycling Board** offers technical assistance and grant funding for applicable recycled content product purchasing.
- ▲ Click on “***Buying Recycled & Environmentally Friendly Products***” at the Agency's website [www.stopwaste.org](http://www.stopwaste.org) for an annotated list of resources and links to other environmental purchasing websites and documents.
- ▲ Contact **Rachel Balsley** at [rbalsley@stopwaste.org](mailto:rbalsley@stopwaste.org) for information about the StopWa\$te Partnership for technical assistance and funding for Alameda County businesses. See also [www.stopwaste.org/partnership/](http://www.stopwaste.org/partnership/)
- ▲ Contact **Debra Kaufman** at [dkaufman@stopwaste.org](mailto:dkaufman@stopwaste.org) for information about technical and financial assistance to local governments in Alameda County.
- ▲ Contact the **Alameda County Recycling Hotline**, toll-free at **1-877-STOPWASTE (786-7927)** for information about recycling and source reduction opportunities in Alameda County.

**Disclaimer**

The information provided in this Fact Sheet should be considered by public agency and business purchasers who are interested in buying environmentally preferable products. It is provided as a public service by the Alameda County Waste Management Authority and Recycling Board in an attempt to provide environmental benefits and reduce costs. The information on products listed is supplied by the manufacturers. Listing in this Fact Sheet is not a recommendation or an endorsement. This Fact Sheet is not a substitute for the exercise of sound judgment in particular circumstances and is not intended as recommendations for particular products or processes.

This Fact Sheet was last updated in October 2002.



*City of Palo Alto Regional Water Quality Control Plant*

*Contact: Julie Weiss*

*Ph: 650.494.7629*

*[julie\\_weiss@city.palo-alto.ca.us](mailto:julie_weiss@city.palo-alto.ca.us)*

*[www.city.palo-alto.ca.us/cleanbay](http://www.city.palo-alto.ca.us/cleanbay)*

## **The City of Palo Alto Switch to Paper Processed Without Chlorine**

### ***Project Description***

In 2001, in response to regional concerns about dioxin emissions, the City of Palo Alto adopted a Dioxin policy "...to eliminate dioxin and its subsequent release to the environment...." The Environmental Compliance Division developed a set of action items it would pursue to reduce dioxin emissions locally and regionally. One of these tasks was the revision of the City's purchasing specifications for office paper products to provide process chlorine free (PCF) supplies. Before discussing the selection of PCF paper, it's important to understand the distinction between paper types.

*Note: The City also later converted to unbleached and alternatively bleached bathroom products. While not the focus of this factsheet, that product information is also included below as it was part of the broader goal to reduce dioxins emissions.*

***Natural resources saved each year during paper manufacturing due to Palo Alto's switch to PCF copy paper\*:***

- 511 trees
- 209,285 gallons of water
- 90 cubic yards of landfill space
- Energy to power 30 Palo Alto homes

***\*Based on 17,000 reams per year. Compared with the previously used 30% recycled-content paper***

### ***Definitions***

#### ***Elemental Chlorine Free (ECF):***

ECF bleaching process utilizes chlorine dioxide or sodium hypochlorite instead of chlorine gas as a bleaching agent. Even though chlorine dioxide has "chlorine" in its name, its chemistry is different from chlorine gas. ECF paper takes a positive step towards reducing dioxin releases. ECF papers may also include recycled-content fiber.

*Processed Chlorine Free (PCF)* always contains feedstock fibers that meet EPA guidelines for post-consumer content. While the recycled-content portion may contain fibers that have been conventionally bleached, the balance of the paper pulp is bleached without using any chlorine containing compounds. Because PCF paper contains significant amounts of recycled-content fibers, PCF paper production can also reduce water, energy, and virgin fiber demands. The term *Processed Chlorine Free* is trademarked by the Chlorine Free Products Association (information below) but is nevertheless used vernacularly by the paper industry.

*Totally Chlorine Free (TCF)* is reserved for virgin fiber papers. TCF papers do not use pulp produced with chlorine or chlorine containing compounds as bleaching agents. Availability of these papers in the United States is still minimal and expensive.



### ***Verifying PCF claims***

During our research on paper availability, it became evident that some individual paper companies' definitions of PCF paper may be incongruent with the standard set above. To verify the authenticity of a company's bleaching process, the Chlorine Free Products Association (CFPA) provides certification for PCF and TCF papers. The City is interested in purchasing papers with this certification which verifies which bleaching process is used, that old growth forest trees are not used for any of the virgin pulp, and that the mill has no current or pending violations. As affordable certified papers become available, the City will examine the feasibility of purchasing them. To date, City Purchasing staff has asked for a written letter from paper manufactures confirming the PCF claim.

### **Current status**

Because of dioxin reductions coupled with other natural resource conserving benefits of PCF paper, the Palo Alto Purchasing and Environmental Compliance Divisions re-specified criteria for copy and letterhead papers to require 100% recycled content PCF paper for City-wide operations. To test how well the paper would work, various PCF copy and letterhead papers were tested in printers throughout the City and the City's print shop. Criteria for acceptance also included brightness, paper opacity, and cost. Several papers performed well and so the most cost-effect choice at that time was selected.

The chart below shows Palo Alto paper choices and prices as of September 2002, and includes information about alternative bleached bathroom products that were also phased in for use during 2002.

<b>Copy paper:</b>	<b>Encore 100DP.</b> Also used Eureka! 100 (Fort James). 100% post-consumer content. Approx. cost: \$2.92 ream/4,440 rms . Purchasing through Recycled Products Purchasing Cooperative (cost increased 20% from previous product-ECF 30% recycled-content paper in 1999). RRPC information listed under <i>Resources</i> .
<b>Letterhead:</b>	<b>New Leaf Everest 100 PCF</b> 24lb, cost: \$9.31 per ream (cost increased 3.44% from previous product).
<b>Hand towels:</b>	<b>Envision Acclaim-</b> 100% recycled, 40% post-consumer waste, unbleached (Fort James) cost: \$19.01/cs (cost decreased 26% from previous product).
<b>Toilet paper:</b>	<b>Envision Acclaim-100% recycled,</b> >20% post consumer content, ECF, (Fort James) cost: \$37.00/cs of 96 rolls (cost decreased 5% from previous product).

### ***Project impact:***

Measuring reduced dioxin levels from the direct purchase of alternative office and bathroom papers is not easily measurable. However, staff recognizes that the City can best contribute to reduced dioxin

---

<sup>1</sup> *White Paper No. 5-Environmental Comparison of Bleached Kraft Pulp Manufacturing Technologies*, Environmental Defense Fund, 1995.

production on both regional and national levels through its purchases, recognizing that dioxins cannot be contained to geographic regions.

The City uses its letterhead as an opportunity to promote alternatively bleached paper with a tagline at the bottom of all letterhead that reads: *Printed on 100% recycled paper processed without chlorine. Printed with soy-based ink.* The paper change also served as a success story for a City Manager's Office Sustainability Program which used to the paper change to increase staff awareness about the positive environmental impact that City purchases can make.

### ***Future Plans***

- Work with the partner cities serviced by the RWQCP to expand these efforts into their jurisdictions.
- Expand PCF paper in-house to include 11x 17 and cardstock, and utility insert paper.

### ***Resources:***

- **Association for Bay Area Governments Dioxins Task Force**  
Dioxin Free Paper Project: [http://dioxin.abag.ca.gov/project\\_materials.htm](http://dioxin.abag.ca.gov/project_materials.htm)

- **Chlorine Free Products Association**  
[www.chlorinefreeproducts.org](http://www.chlorinefreeproducts.org)

*CFPA promotes Total Chlorine Free (TCF) policies, programs, and technologies and products throughout the world*

- **Conservatree List of Environmental Papers**  
[www.conservatree.com](http://www.conservatree.com)

*Conservatree is a nonprofit catalyst and advocate for ecologically sustainable paper markets.*

- **Printers National Environmental Assistance Center**  
[www.pneac.org/sheets/all/paper.html](http://www.pneac.org/sheets/all/paper.html)

*PNEAC assists regulatory agencies and technical assistance providers by delivering current, reliable environmental compliance and pollution prevention information to printers, publishers, and packagers.*

- **Recycled Products Purchasing Cooperative**  
[www.recycledproducts.org/](http://www.recycledproducts.org/)

*A cooperative that provides recycled copy paper and products at prices that meet or beat what many businesses and public entities pay for non-recycled copy paper and products.*

1 [Wood Preservatives]

2  
3 Resolution urging PG&E, Pacific Bell and manufacturers of non-wood utility poles to  
4 conduct a feasibility study of alternatives to chemically treated wood utility poles and  
5 urging all utility poll owners to take steps to protect public health and the environment  
6 from wood preservatives in utility poles.

7  
8 WHEREAS, In 1999, the City and County of San Francisco adopted an  
9 Environmentally Preferable Purchasing Ordinance stating that it shall be the policy of the City  
10 to aggressively pursue the goal of reducing the health and environmental impact of products  
11 used in its operations; and,

12 WHEREAS, in 1996, the City and County of San Francisco adopted an Integrated Pest  
13 Management Ordinance mandating that San Francisco minimize its pesticide use and reduce  
14 the negative impact of pesticides on people and the environment; and,

15 WHEREAS, the Integrated Pest Management Ordinance does not currently include  
16 any wood preservatives on the "Approved List of Reduced Risk Pesticides" for San Francisco;  
17 and,

18 WHEREAS, the U.S. EPA estimates that nearly 700 million pounds of wood  
19 preservatives are used annually in the United States; and,

20 WHEREAS, an analysis of EPA's Inventory of Sources of Dioxin in the United States  
21 notes that treated wood is a large potential source of dioxin in the environment; and,

22 WHEREAS the Commission on the Environment and the Board of Supervisors of the  
23 City and County of San Francisco have adopted resolutions urging the elimination of dioxin  
24 pollution; and,

1 WHEREAS, the City and County of San Francisco prohibits the use, requisition or  
2 purchase, directly or indirectly, by any City or County department or agency, of any tropical  
3 hardwoods or tropical hardwood wood products as well as virgin redwood or virgin redwood  
4 wood products; and,

5 WHEREAS, the US EPA has classified Pentachlorophenol (Penta), the most  
6 commonly used wood preservative, as a Group B2, probable human carcinogen, and,

7 WHEREAS, the contaminants of Penta, namely dioxins, furans, and  
8 hexachlorobenzene (HCB) are all recognized as carcinogens, mutagens, teratogens, and  
9 endocrine disruptors; and,

10 WHEREAS, Penta is banned in several countries outside of the United States due to  
11 health or environmental risks; and,

12 WHEREAS, the US EPA has classified Creosote, another common wood preservative,  
13 as a Group B1, probable human carcinogen; and,

14 WHEREAS, Creosote contains polycyclic aromatic hydrocarbons, which are classified  
15 as Persistent Organic Pollutants (POPs) and are listed on the US EPA's Priority List of  
16 hazardous substances; and,

17 WHEREAS, at least 314 Superfund or chemical waste sites in the United States have  
18 been contaminated with Penta and 31 Superfund sites have been contaminated with  
19 Creosote; and,

20 WHEREAS, another common wood preservative, Copper Chromium Arsenic (CCA),  
21 contains inorganic arsenic which has been classified by the US EPA as a Group A, known  
22 human carcinogen; and,

23 WHEREAS, CCA also contains chromium VI, which is listed as a chemical known to  
24 cause cancer under California's Safe Drinking Water and Toxic Enforcement Act and has  
25

1 been classified by the US EPA as a Group A, known human carcinogen of high carcinogenic  
2 hazard; and,

3 WHEREAS, other chemicals used to preserve wood utility poles may have adverse  
4 impacts on human health and the environment; and,

5 WHEREAS, the handling of chemically treated wood utility poles and the retreatment  
6 of existing chemically treated wood utility poles could expose the public to serious health  
7 hazards; and,

8 WHEREAS, PG&E and Pacific Bell own the majority of the chemically treated wood  
9 utility poles in San Francisco; and,

10 WHEREAS, PG&E and Pacific Bell have agreed to work with the Department of the  
11 Environment to identify alternatives to chemically treated wood utility poles in a timely  
12 manner; now, therefore be it

13 RESOLVED, that the Board of Supervisors of the City and County of San Francisco  
14 urges PG&E, Pacific Bell, and manufacturers of non-wood utility poles, including steel,  
15 fiberglass, and concrete utility pole manufacturers, to conduct a feasibility study, within six  
16 months of the passage of this resolution, of alternatives to chemically treated wood utility  
17 poles, including an analysis of the effectiveness of wrapping chemically treated wood poles to  
18 prevent leaching of chemicals into the environment, a plan for the safe disposal of chemically  
19 treated wood poles, and an explanation as to why alternatives to chemically treated wood  
20 poles cannot be used in particular situations; and, be it

21 FURTHER RESOLVED, that the Board of Supervisors urges that utility pole owners,  
22 as a precautionary measure, cover, within twelve months of the passage of this resolution,  
23 the first five feet above ground level of all existing chemically treated wood poles owned by  
24 them that are located within 100 feet of any elementary school or park and of all existing  
25



1 chemically treated wood poles owned by them that are located within 100 feet of any licensed  
2 day care center, upon request of the day care center; and, be it

3 FURTHER RESOLVED, that the Board of Supervisors urges that utility pole owners  
4 present an annual report to the Commission on the Environment on the number and location  
5 of poles that were replaced, including the types of replacement poles that were installed; and,  
6 be it

7 FURTHER RESOLVED, that the Board of Supervisors urges utility pole owners not to  
8 purchase utility poles made from old growth wood such as tropical hardwood or virgin  
9 redwood; and, be it

10 FURTHER RESOLVED, that the Board of Supervisors urges that all storage sites  
11 within San Francisco of treated poles be covered from the elements of weather; and, be it

12 FURTHER RESOLVED, that the Board of Supervisors urges the State of California to  
13 conduct a feasibility study for wrapping chemically treated wood utility poles and to identify  
14 and promote alternatives to chemically treated wood utility poles.



# City and County of San Francisco

City Hall  
1 Dr. Carlton B. Goodlett Place  
San Francisco, CA 94102-4689

## Tails Resolution

File Number: 011117

Date Passed:

Resolution urging PG&E, Pacific Bell and manufacturers of non-wood utility poles to conduct a feasibility study of alternatives to chemically treated wood utility poles and urging all utility pole owners to take steps to protect public health and the environment from wood preservatives in utility poles.

June 18, 2001 Board of Supervisors — ADOPTED

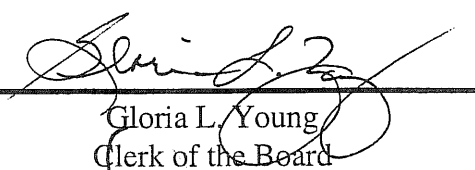
Ayes: 11 - Ammiano, Daly, Gonzalez, Hall, Leno, Maxwell, McGoldrick,  
Newsom, Peskin, Sandoval, Yee

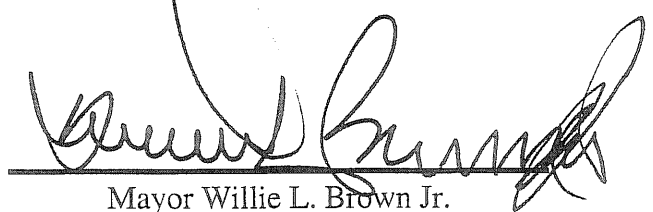
File No. 011117

I hereby certify that the foregoing Resolution  
was ADOPTED on June 18, 2001 by the  
Board of Supervisors of the City and County  
of San Francisco.

JUN 29 2001

Date Approved

  
Gloria L. Young  
Clerk of the Board

  
Mayor Willie L. Brown Jr.

## PVC Free Building Material Alternatives

Page	CSI	CATEGORY
1	*** 02480 - MARINE WORK ***	
2	*** 02600 - DRAINAGE & SEWER SYSTEMS (piping)***	see 15100 for full discussion of pipes
2	*** 02810 - IRRIGATION (piping) ***	
3	*** 07100 - WATERPROOFING (Water stops) ***	
4	*** 07450 - SIDING ***	
6	*** 07530 - ROOF MEMBRANES for low slope roofs***	
7	*** 08000 - DOORS & WINDOW FRAMES ***	
8	*** 09510 - ACOUSTICAL CEILING TILE ***	
9	*** 09640 - WOOD FLOORING***	(as substitute for vinyl resilient floor)
10	*** 09650 - RESILIENT FLOORING ***	(see resilient flooring chart at <a href="http://www.healthybuilding.net">www.healthybuilding.net</a> for more detail)
11	*** 09680 - CARPET ***	(See carpet chart for more detail)
12	*** 09700 - 09900 - WALL COVERINGS ***	
13	*** 10260 - DOOR and WALL PROTECTION ***	
14	*** 10800 - BATH (shower curtains) ***	
14	*** 12490 - WINDOW TREATMENTS ***	See 9700 wall coverings for more discussion of fabrics
14	*** 12500 - FURNITURE ***	See 9700 wall coverings for more discussion of fabrics
15	*** 15100 & 15400 - BUILDING SERVICES PIPING & PLUMBING (pipes)***	
17	*** 16000 - ELECTRICAL CABLES ***	
17	*** 16000 - CONDUIT, DUCT & EMT & JUNCTION BOXES ***	

This list is intended to provide a representative sampling of products and materials that do not contain PVC that are commercially available for a variety of applications. It is not intended to be comprehensive and in a rapidly changing market, the completeness and accuracy of this information cannot be guaranteed. Inclusion on this list does not imply endorsement of any product or manufacturer, nor any warranty of the appropriateness of listed products for a particular application.

Replication of this information for educational purposes is permitted with credit and the inclusion of these disclaimers.

Material	Brands	Description (Application, composition)	Characteristics (features, installation, use, maintenance, performance /durability)	Impacts (use & life cycle)	Cost factors (buy, install, maintain)	Manufacturer access	Bay area access	Web links
*** 02480 - MARINE WORK ***								
FSC certified wood	Sylvania Massaranduba	FSC certified decking and marine wood				Sylvania, Sante Fe, NM, 800-468- 6139	Earthsource, Berkeley, CA 866-549-9663	<a href="http://www.certifiedwood.com">www.certifiedwood.com</a>
	Greenheart	Trpocal wood. Check for FSC certification of sustainable harvest						
Concrete								
Coated Steel								

## PVC Free Building Material Alternatives

*** 02600 - DRAINAGE & SEWER SYSTEMS (piping)*** see 15100 for full discussion of pipes								
HDPE (High Density Polyethylene)	ADS	Drainage				Advanced Drainage Systems, Hilliard, OH 800-821-6710		<a href="http://www.ads-pipe.com">www.ads-pipe.com</a>
Recycled HDPE	EcoFirst	Post industrial recycled polythylene for drainage				Hancor, Inc. 888-FOR PIPE	Santa Rosa CA, Doug Allard, 707-524-8181	<a href="http://www.hancor.com">www.hancor.com</a>
Recycled HDPE	Wisconsin Plastic Drain Tile	Post industrial recycled polythylene for drainage				Jefferson WI, Plastic Drain Tile 800-362-6642	Direct from manufacturer only	<a href="http://www.draintile.com">www.draintile.com</a>
Copper								
Ductile Iron								
Concrete								
*** 02810 - IRRIGATION (piping) ***								
Copper	many					widely available	any plumbing supply	
HDPE	Jain					Jain Irrigation , Columbus, OH 888-473-7539		<a href="http://www.jains.com">www.jains.com</a>
HDPE & Aluminum	Irriline					Irriline, Vancouver, BC, (604) 608-4315		<a href="http://www.irriline.com">www.irriline.com</a>

## PVC Free Building Material Alternatives

*** 07100 - WATERPROOFING (Water stops) ***								
<b>Bentonite</b>	<b>CETCO RX</b>	expands with water contact				Cetco, Arlington Heights, Ill, 800-527-9948	Construction Resource, Oakland, 510-729-6300	<a href="http://www.cetco.com">www.cetco.com</a>
<b>Butyl rubber</b>	<b>Henry Hydroflex</b>	expands with water contact				Henry, Huntington Park, CA, 323-583-5000	Home Depot	<a href="http://www.henry.com">www.henry.com</a>
<b>Bitumen asphalt</b>	<b>Henry Synkoflex</b>	non swelling preformed adhesive				Henry, Huntington Park, CA, 323-583-5000	Home Depot	<a href="http://www.henry.com">www.henry.com</a>
<b>Urethane</b>	<b>MME Hydrotite</b>	expands with water contact				MME, Mississauga, Ontario, 800-663-6633	Direct from manufacturer only	<a href="http://www.multiurethanes.com">www.multiurethanes.com</a>
<b>Urethane</b>	<b>Green Streak</b>					Ontario, CA, 800-325-9504	White Cap, San Leandro, CA, 510-729-6464	<a href="http://www.greenstreak.com">www.greenstreak.com</a>
<b>TPV (Thermoplastic vulcanizite)</b>	<b>JPS Earth Shield</b>	elastomeric rubber ribbed center bulb preformed fittings	*Pro: withstands higher temperature swings			JPS Earth Shield, Lk Elsinore, CA, 800-821-3859	Direct from manufacturer only	<a href="http://www.jpspecialities.com">www.jpspecialities.com</a>



## PVC Free Building Material Alternatives

\*\*\* 07450 - SIDING \*\*\*

Note that PVC siding has been connected with mold problems due to entrapment of moisture

FSC Certified Sustainably harvested wood						Forest Ethics database of suppliers		<a href="http://www.forestethics.org/html/eng/468.shtml">www.forestethics.org/html/eng/468.shtml</a>
	Almquist Lumber	flooring, plywood, molding laminents, some siding , melamine; not all FSC. FSC certified woods are the redwood, tan, oak, and madrone.				Almquist Lumber, Blue Lake, CA, 707-668-5652	Direct from Blue Lake	<a href="http://www.almquistlumber.com">www.almquistlumber.com</a>
	Big Creek	FSC redwood; they do flooring, siding, framing.				Big Creek Lumber, Davenport, CA, 800-464-2770	Direct from Davenport	<a href="http://www.big-creek.com">www.big-creek.com</a>
	CedarPro	FSC cedar siding - T&G, bevel & log cabin				ForestChoice, Stockton, CA, (209) 932-5008	Direct from Stockton	<a href="http://www.forestchoice.com">www.forestchoice.com</a>
	Menominee Tribal Enterprises	FSC multiple species, siding, decking.				Menominee, Neopit, WI, 715-756-2314	Direct from manufacturer only	<a href="http://www.menominee.edu/mte">www.menominee.edu/mte</a>
	Windfall Lumber	FSC certified and salvaged flooring, cedar and fir siding				Windfall, Olympia, WA, 360-352-2250	Direct from manufacturer only	<a href="http://www.windfalllumber.com">www.windfalllumber.com</a>
Engineered wood	CollinsWood TruWood	Lap board siding		*Pro: SCS certified 50% recycled/reclaimed wood FSC certified available		Collins Company, Portland, OR, 800-329-1219	Home Depot; Golden St Lumber, American Cnyn, 707-648-7000	<a href="http://www.collinswood.com">www.collinswood.com</a>
OSB (Oriented Strand Board)	Louisiana Pacific	Board siding of aspen and pine and MDI binder	25 year warranty (prorated after 5 yrs)	*Pro: no formaldehyde binder, uses fast growing species instead of old growth *Con: MDI hazardous in manufacture		Louisiana Pacific, Portland, OR, 800-648-6893	Sierra Pt Lumber, So SF, 415-468-5620; Western Plywood, SF 415 431-3600	<a href="http://www.lpcorp.com/">http://www.lpcorp.com/</a>

## PVC Free Building Material Alternatives

<b>Textured plywood</b>	<b>APA T1-11</b>	Board siding		*Pro: combined sheathing & siding = less material use *Con: needs higher quality logs than OSB. Uses phenol formaldehyde binder	one of lowest cost alternatives	Tacoma, WA, 253-565-6600	many lumber yards	<a href="http://www.apawood.org">www.apawood.org</a>
<b>Stucco</b>		Coating with cement and lime or polymer (acrylic or butyl) or combination	Integral color can make painting unnecessary	*Con: cement has high embodied energy, polymers release toxins in manufacture		Many. Stucco Manufacturers Assoc or yellow pages under stucco for local contractor	Yellow pages under Stucco	<a href="http://www.stuccomfgassoc.com">www.stuccomfgassoc.com</a>
<b>Brick</b>		Masonry facing	Durable low maintenance			Many. Brick Industry Assoc	check yellow pages under masonry	<a href="http://www.bia.org">www.bia.org</a>
<b>Fiber cement</b>	<b>James Hardie, Hardie Board</b>	Board or shingle siding of wood waste and cement	Durable (50 year warranty) low maintenance	*Pro: wood process waste fiber *Con: high embodied energy in cement		James Hardie Building Products, 800-942-7343	many lumber yards, Home Depot	<a href="http://www.jameshardie.com">www.jameshardie.com</a>
<b>Polypropylene</b>	<b>Certainteed Cedar Impressions</b>	Board or shingle siding. Note Certainteed also makes vinyl siding as well.	Low maintenance, 50 year failure warranty, 7 year "excessive fade"			CertainTeed, 800-233-8990;	DLH Distributors, Rancho Cordova, CA, 916-638-2156	<a href="http://www.certainteed.com">www.certainteed.com</a>
<b>Polypropylene</b>	<b>Alcoa Mastic Cedar Discovery</b>	Beware: Alcoa makes many vinyl sidings as well				Alcoa Home Exteriors, Inc., Pittsburgh, PA, 800-962-6973	Rocky Mntn Wholesale, Alameda, 510-522-2700;	<a href="http://www.mastic.com">www.mastic.com</a>
<b>Polypropylene</b>	<b>Louisiana Pacific</b>	Beware: LP makes many vinyl sidings as well				Louisiana Pacific, Portland, OR, 800-648-6893		<a href="http://www.lpcorp.com">www.lpcorp.com</a>
<b>Polypropylene</b>	<b>Alside Pelican Bay</b>					Alside, Akron, Ohio, 800-922-6009	Alside, Sacramento, 1-800-468-3401	<a href="http://www.alside.com">www.alside.com</a>

## PVC Free Building Material Alternatives

*** 07530 - ROOF MEMBRANES for low slope roofs***								
Most membranes listed here are available as Energy Star surfaces								
TPO (Thermoplastic Polyolefin)	Stevens EP	Commercial / residential polyester reinforced membrane	White, gray, colors or black, heat weldable, weather like EPDM w/o the seam failure issues. Use 60mm or thicker for durability	*Pro: white for cool roofs, can be down-cycled	competitive or less than PVC	Stevens Roofing, Holyoke, MA 800-621-ROOF	Davey Roofing, Hayward, CA 877-321-7663	<a href="http://www.stevensroofing.com">www.stevensroofing.com</a>
TPO (Thermoplastic Polyolefin)	Firestone UltraPly					Firestone, Carmel, IN, 800-428-4442	Construction Resource, Oakland, 510-729-6300	<a href="http://www.firestonebpco.com">www.firestonebpco.com</a>
TPO (Thermoplastic Polyolefin)	many more					including Carlisle, GAF, Genflex, Johns Mansville, Mule Hide, more		
EPDM (Ethylene Propylene Diene Monomer)	Firestone Rubbergard MaxFR	Commercial / residential membrane	Black, White Energy Star now available			Firestone, Carmel, IN, 800-428-4442	Construction Resource, Oakland, 510-729-6300	<a href="http://www.firestonebpco.com">www.firestonebpco.com</a>
FPO (Flexible Polyolefin Alloy)	Sarnafil T	Commercial membrane	White, heat weldable	*Pro: white color for cool roofs, can be down-cycled (NOTE: most Sarnafil products are PVC and poorly labeled)		Sarna, Canton, MA 800-576-2358		<a href="http://www.sarnafilus.com">www.sarnafilus.com</a>
MBM (Modified Bitumen) SBS (Styrene Butadiene Styrene)	Consolidated Fiberglass Products, MB Technology,	Commercial / residential asphaltic rubber membrane of styrene-butadienestyrene added to asphalt	torch applied	* Con: styrene butadiene manufacture has significant toxic emissions				
MBM (Modified Bitumen) APP (Acstatic polypropylene)	Firestone and others	Commercial / residential asphaltic rubber membrane (atactic polypropylene added to asphalt)	hot asphalt, torch or cold applied	*Con: high emissions from hot asphalt application		Firestone, Carmel, IN, 800-428-4442 and many other manufacturers	Construction Resource, Oakland, 510-729-6300	<a href="http://www.firestonebpco.com">www.firestonebpco.com</a>
Metal	Many	Commercial / residential rigid roof						

## PVC Free Building Material Alternatives

### \*\*\* 08000 - DOORS & WINDOW FRAMES \*\*\*

Note: PVC windows have been susceptible too excess expansion and shrinkage under temperature changes, cuaing leaks between frame and wall. Note that many composite windows are part PVC and that PVC jamb liners and other parts are included in many "non PVC" windows

Wood	Andersen, Jeld-Wen, Marvin, Pella, Weathershield & many others	Residential and light commercial	*Pro: Much lower thermal expansion coefficient. *Con: requires more maintenance than PVC but if maintained should last longer. Engineered wood products may require less. See aluminum or fiberglass cladding to avoid maintenance.	Seek recycled, reclaimed and/or FSC certified sustainably harvested wood. Note that many wood windows have PVC jamb liners.		Andersen Window, Bayport, MN 612-439-5150	Collier Warehouse, Inc, 415-920-9720; Truit & White, Berkeley 510-644-2671; Alexander Co, 650-583-0860.	<a href="http://www.Andersonwindows.com">www.Andersonwindows.com</a>
Wood with aluminum or fiberglass cladding	Milgard, Weathershield, Marvin, Sierra Pacific, Kolbe, Caradaco, Fibertec, Anderson & more	Residential and light commercial	*Pro: Much lower thermal expansion coefficient, maintenence free and generally more durable than PVC.	*Con: Fiberglass & aluminum processing emits significant air pollution. Fiberglass difficult to recycle, no recycled content		Milgard, 1-800-MILGARD and many more	look in yellow pages under 'glass', 'window', or 'doors'	<a href="http://www.milgard.com">www.milgard.com</a>
Fiberglass	Fibertec, Inline and others	Commerical / residential, polyester resins and glass fibers mixed and extruded. Carado uses Timberstrand eng wood core.	*Pro: Much lower thermal expansion coefficients and generally more durable than PVC. Low maintenance	*Con: Fiberglass processing emits significant air pollution. Difficult to recycle, no recycled content	Less than custom wood frames but more than other standard types	Fibertec, Ontario, Canada, 888-232-4956 or Inline, Ontario, Canada, 416-679-1171	Wilson & Wells, San Leandro, CA, 510-667-0162	<a href="http://www.inlinefiberglass.com">www.inlinefiberglass.com</a>
recycled HDPE (high density polyethylene plastic)	Center Industries		*Pro: Much lower thermal expansion coefficients and generally more durable than PVC. Low maintenance	*Pro: 90% recycled HDPE		Center Industries Sioux Center, IA 800-281-4049 866-722-1488	direct from manufacturer	<a href="http://www.center-industries.com">www.center-industries.com</a>
Aluminum	Many		*Pro: durable and low maintenance. Much lower thermal expansion coefficients. *Con: Higher heat loss even with added thermal break. Prone to indoor condensation	*Pro: can use recycled materials *Con: energy intensive to make		Many suppliers.	check Yellow Pages	

## PVC Free Building Material Alternatives

\*\*\* 09510 - ACOUSTICAL CEILING TILE \*\*\*

Note: beware of PVC as protective scrubbable surface coating. Ethylene vinyl acetate (EVA) sometimes used as a coating is not PVC despite the "vinyl" in the name

<b>Mineral wool</b>	<b>Armstrong</b>	recycled mineral wool & newsprint paper	Humiguard 10-15 year mold/mildew warranty NOTE: some Armstrong ceiling products use vinyl latex surface finish	*Pro: 25-85% recycled content - mineral wool (mostly PI from steel industry waste ) & newsprint paper. Armstrong has aggressive PC recycling program for old panels.		Armstrong World Industries, Lancaster, PA 877-276-7876	AMS, San Jose, CA, 408-279-1141	<a href="http://www.ceilings.com">www.ceilings.com</a>
<b>Mineral wool</b>	<b>USG</b>	recycled mineral wool & newsprint paper	*Pro: Astro has high NRC rating of .50 to .60, a CAC rating of 35 to 39 and a high LR (light reflectance) value of .85. "Aegis Microbe Shield" treatment for mold mildew resistant w/10-30 yr warranty(humidity not water) NOTE: some USG products come vinyl faced: Clean Room ClimaPlus, Orion 210, Premier Hi-Lite ClimaPlus, SHEETROCK® Brand Lay-in Clean Room Vinyl.	*Pro: 40-85% recycled content - mineral wool (mostly PI from steel industry waste ) & newsprint paper. Some PC recycling of old panels from "select customers"		USG, Chicago, IL 800.874.4968	California Wholesale Materials, San Francisco, 415-282-0711	<a href="http://www.usg.com">www.usg.com</a>
<b>Perlite</b>	<b>Chicago-Metallic Eurostone</b>	Eurostone has perlite, ceramic clay and a liquid glass binder, no phenol resins; also glass reinforced gypsum, fabric/fiberglass, metal (steel/aluminum), drywall	*Pro: not support mold, bacteria, or fungus, impervious to water, humidity, heat and flame, 30 yr + life			Chicago Metallic Corporation, Chicago, IL, 708-563-4600	Ceiling Systems, 415-642-6750; Pacific Supply, 510-832-5734, 415-285-1010	<a href="http://www.chicago-metallic.com">www.chicago-metallic.com</a>
<b>Wood fiber</b>	<b>Tectum</b>	aspen wood fibers in an inorganic hydraulic cement binder, commonly used in schools,	*Pro: more durable *Con: lower acoustical performance, harder to cut		more expensive than standard ACT	Tectum, Inc, Newark, OH (888) 977-9691, (740) 345-9691	Finish Line, Portola Valley, CA, 650-233-1360; Pinnacle, Hayward 510-264-5470	<a href="http://www.tectum.com">www.tectum.com</a>



## PVC Free Building Material Alternatives

*** 09640 - WOOD FLOORING*** (as substitute for vinyl resilient floor)								
Wood	ForestWorld	FSC certified plank and floating floors				Forest World, Middleburg, VT, 802-382-8888	Sante Fe, NM, 1-800-468-6139	<a href="http://www.forestworld.com">www.forestworld.com</a>
	Earthsource	FSC certified plank and floating floors				Earth Source, Oakland, CA, 866-549-9663, 510-208-7257	Plywood & Lumber Sales, SF, 415-648-7257	<a href="http://www.earthsourcewood.com">www.earthsourcewood.com</a>
	EcoTimber	FSC certified plank and floating floors				Ecotimber, San Rafael, CA 415.258.8454	SeeSan Rafael location	<a href="http://www.ecotimber.com">www.ecotimber.com</a>

## PVC Free Building Material Alternatives

\*\*\* 09650 - RESILIENT FLOORING \*\*\* (see resilient flooring chart at [www.healthybuilding.net](http://www.healthybuilding.net) for more detail)

Natural linoleum	Forbo, Armstrong, and Domco Tarkett	plant based tile and sheet goods from flax linseed oil, wood flour, pine resins, and natural colorants, sheet good w/ jute backing or tile with polyester backing	*Pro: anti static, anti bacterial, long wear life (40+ yrs?), minimal maintenance requirements (no stripping and waxing), *Con: not recommended for wet environments. NOTE: Forbo is heavier duty commercial grade than Armstrong	+rapidly renewable, decomposes in dump -Outgases VOCs (no known carcinogens or repro development toxins, but can be allergen problem for certain sensitive people)	\$3 - \$6 installed in 02	See resilient chart		See resilient chart
Bamboo	Bamboo Hardwoods, Flooring Alternatives, Moso, PlyBoo, Smith & Fong, Timbergrass, and many others	standard plank flooring product made from laminated bamboo (also available in floating floor)	*Pro: more resilient than red oak, good water resistance	*Pro: rapidly renewable resource (4 years to maturity) *Con: unknown labor practices in SE Asia, some bamboos use urea formaldehyde binders	comparable to hardwood floor	See resilient chart		See resilient chart
Cork	Expanko, Duro Design, Flooring Alternatives Gerbert, We Cork, Wicanders and many other manufacturers	tile and plank and floating floor from natural cork	*Pro: anti bacterial, mildew, mold, rot resistant, fire retardent, thermal, vibration and acoustic barrier, soft, warm under foot, self healing, thermally stable, hypo-allergenic, durable, long wear life (many high traffic installs from 1920s still in use), minimal maintenance requirements (no stripping and waxing)	*Pro: rapidly renewable (harvestable every 9-10 years for 100-150 yrs) healthy for tree, Often use cork waste *Con: Some manufacturers use urea formaldehyde binders	\$3 - \$8 installed in 01	See resilient chart		See resilient chart
Polymer	Amtico Stratica	polymer resin/ ethylene copolymer product akin to high end vinyl, comes in 333 mm (13'1/2) & 500 mm 19" squares and 100mm (4") X 1000mm (39") planks. (Base sheet is 1000mm square)	sophisticated patterns, realistic wood and stone prints, drop in replacement for vinyl, Claims highly stain resistant and 10X tough as lino (same Surlyn wear layer as golf balls - 10 yr wearout guarantee) plus eliminates need for waxing, claims low impact and reflected noise	*Pro: VOC, PVC and plasticizer free, solvent free adhesive, certified ISO 14001, recyclable *Con: petrochemical based, due to adhesives probably only practical for post industrial recycling	slightly above high end vinyl (\$6.50/sf per Amtico rep in 01 in CA), installation equal, maintenance near 0	Amtico Intl., Atlanta, GA 404-267-1900	Ann Donkle (925) 838-9490	<a href="http://www.stratica.com/">www.stratica.com/</a>
Rubber	Nora, Mondo, ToMarket, Dodge Regupol and many other manufacturers	Both virgin and recycled rubber sheet and tile goods	+ anti bacterial, mildew, mold, rot resistant, long wear life, some have minimal maintenance requirements (no stripping and waxing)	Rubber floor products differ widely. Some outgas VOCs, have odor, others are very clean	\$3- \$10/sf in 01	See resilient chart		See resilient chart

## PVC Free Building Material Alternatives

*** 09680 - CARPET *** (See carpet chart for more detail)								
Natural fibers (Wool, jute, other grasses)	many manufacturers	Broadloom carpet					Naturlich Floor- coverings, Se- bastapol; An- derson, Oak- land; Dick's Carpet, Berk- eley, many other outlets	
Nylon 6	Mohawk Evergreen	Broadloom & modular carpet		*Pro: closed loop recycling (face only, backing still downcycled)		Mohawk, Atlanta GA, SW office, Marty Spillman, 909-898-4600 (CALL BACK)	Infinity Nylon, Will Fortune, 415 648-7292	<a href="http://www.infinitynylon.com">www.infinitynylon.com</a>
	Shaw Eco solution/ EcoWorx					Shaw Contract, Dalton GA 800- 441-7429	Jim Thompson, 1-800-637-2849	<a href="http://www.shawcontract.com">www.shawcontract.com</a>
Polyurethane	Milliken Image	Polyurethane modular carpet in 3' tile	*Pro: Non VOC adhesive is releasable for easier change out, 3' tiles mean fewer seams, custom patterns availble	*Pro: designed for EarthSquare process. *Con: only 4% recycled content		Milliken, Spartanburg, SC 864-503-2506	SF, 415-773- 5389, 415-454- 8575; Jeremy Rude, 408-366- 6570 (for government contracts)	<a href="http://www.milliken.com">www.milliken.com</a>
Reuse	Milliken EarthSquare Renewal process	Renewal process of deep cleaning, retexturing and restyling modular carpet 2X for up to 30 year life. (can be done on many non Milliken carpets)	*Pro: Non VOC adhesive is releasable for easier change out	*Pro: true reuse, tho limited to two reuses cycles before downcycling, like Interface company wide approach to enviro issues		Milliken, Spartanburg, SC, 877-E2-RENEW	see above	<a href="http://www.earthsquare.com/">www.earthsquare.com/</a>
Nylon 6,6	Interface Wabi & Sabi / NexStep	20" tile carpet recycled 6,6 nylon, high density urethane NexStep backing,	*Pro: polycarbite seam sealer moisture impervious, Non VOC adhesive is releasable for easier change out (NOTE SomeInterface backings contain PVC)	*Pro: incorporates recycled material, "zipper" for easy 100% recycling, factory is solar powered, low energy dye process. Company will recycle or repurpose old carpet *Con: Can only downcycle at this time. Not closed loop		Interface, Atlanta GA, 770-437-6800	San Francisco, 415-421-7700 or Mark Iberri (800) 336-0225 X1705	<a href="http://www.interfaceinc.com">www.interfaceinc.com</a>

## PVC Free Building Material Alternatives

\*\*\* 09700 - 09900 - WALL COVERINGS \*\*\*

Note: PVC wall coverings are associated with serious mold problems due to entrapment of moisture in wall cavity

<b>Wood fiber/ polyester</b>	<b>Innvironments / Allegory</b>	NOTE: Some Innovations products contain vinyl	Type II rating, Class A flame, Washable, but not scrubable, more permeable than vinyl. Not for high moisture areas	*Pro: no heavy metals or formaldehyde	\$13/yd in 6/2000	Innovations in Wallcoverings NY, NY, 212-807-6300	SKAAR Furnishing, San Francisco, 415-487-9900	<a href="http://www.innovationsusa.com">www.innovationsusa.com</a>
<b>Cellulose/ polyester</b>	<b>Roos Moment Environmental</b>		Type I, Class A flame, washable			Roos Intl, Deerfield, FL 800-888-2776	direct from manufacturer	<a href="http://www.momentwallcoverin.com">www.momentwallcoverin.com</a>
<b>Polyester</b>	<b>Pallas Cares &amp; Terratex</b>	Polyester, and recycled polyester, (NOTE: Pallas also produces vinyl wall coverings).	Some use Avora FR flame and stain resistant	recyclable	\$20-\$55/yd (05/02)	Pallas, Green Bay, WI 800-4PALLAS, 920-468-1600	Ann Greiner, Pallas Textiles, 415-252-0943	<a href="http://www.pallastextiles.com">www.pallastextiles.com</a>
<b>Polyester</b>	<b>Xorel</b>		38 designs, 400 colorways, non absorbent, stain resistant and aggressively scrubable, inherently flame retardent Class A & Class 1, anti-bacterial, antifungal and anti-staph, self healing, no fade in 10 years of use	*Pro: non toxic	\$21.50/yd+	Carnegie Fabrics, Rockville Cntr, NY 516-678-6770 800-727-6770	Nancy Dul, Sausalito, CA, 415-339-9112	<a href="http://www.xorel.com">www.xorel.com</a>
<b>Polyester</b>	<b>DesignTex</b>	100% recycled & poly blends w/natural fibers (NOTE: some Design Tex products are vinyl)	9 colorways		\$18/yd	DesignTex 800-221-1540	Galleria San Francisco Design, 415-864-4144	<a href="http://www.dtex.com">www.dtex.com</a>
<b>Cellulose</b>	<b>Duraprene</b>	reprocessed cellulose fibers from tree farms bonded in latex under high pressure	Class A fire rating, equiv to Type II vinyl, abrasion and stain resistant, washable and scrubable		\$15-18/yd (2/02)	Blumenthal 860-824-8000	Galleria San Francisco Design, 415-864-4144	<a href="http://www.blumenthalwallcoverin.com">www.blumenthalwallcoverin.com</a>
<b>Recycled paper</b>	<b>Dialtones, Thatch</b>	Japanese phonebooks		50-75% recycled phone books, rest paper pulp	\$13.50-\$15/yd (05/02)	Pallas, Green Bay, WI 800-4PALLAS	Ann Greiner, Pallas Textiles, 415-252-0943	<a href="http://www.pallastextiles.com">www.pallastextiles.com</a>
<b>Polychromatic finish coatings</b>	<b>Polmyx, Zolotone</b>	look for low VOC water-based formulas	100s of color combinations, Class A fire rating, stain resistant, abrasion resistant, washable, scrubable, resistant to fungus and bacteria, unlike vinyl, can be touched up		\$4.5 to \$13/yd	Tri-Kes Wall-covering Source, Dallas, TX, 800-200-8120		<a href="http://www.zolatone.com/">www.zolatone.com/</a>
<b>Wool/ Ramie</b>	<b>McDon-ough Coll- ection</b>		Custom high end fabric	Pro: low impact manufacturing	\$59/yd	DesignTex 800-221-1540	Galleria San Francisco Design, 415-864-4144	<a href="http://www.dtex.com">www.dtex.com</a>

## PVC Free Building Material Alternatives

<b>Wood fiber</b>	<b>Tectum</b>	See 09510 acoustical ceiling tile				Tectum, Newark, OH, 888-977-9691	Pinnacle, 510-264-5470	<a href="http://www.tectum.com">www.tectum.com</a>
<b>Fabric</b>	<b>many manufacturers</b>	Many other natural fiber and other fabric alternatives are available						
<b>*** 10260 - DOOR and WALL PROTECTION ***</b>								
<b>Recycled HDPE</b>	<b>InPro EnviroGT</b>	Handrails and corner guards from recycled HDPE & FSC certified wood				InPro Corp., Muskego, WI, 800-222-5556	Ron Lee 530-867-1895	<a href="http://www.inprocorp.com">www.inprocorp.com</a>
<b>Metal (Stainless steel, aluminum, brass and bronze)</b>	<b>Tubular Specialties and Pawling</b>	grab rails, corner guards				Tubular Specialties, Los Angeles, CA, 800-225-5876 (see also Pawling below)	EM Hundley, SF 415-777-5050; Alpha West, So SF, 650-952-6886; Specialties, SF, 415-626-9895; Bay Area Bldrs Hdwe, SF, 415-431-9600	<a href="http://www.calltism.com">www.calltism.com</a>
<b>Lexan</b>	<b>Pawling and Tubular Specialties</b>	corner guards (Note: many of Pawlings products contain vinyl)				Pawling, NY, (800) 431-0101 (see also above for Tubular )	Lindsey Associates, Palo Alto, Susan at 650-324-1133 (Call)	<a href="http://www.pawling.com">www.pawling.com</a>
<b>Wood</b>	<b>Pawling and others</b>	handrails				Many		

## PVC Free Building Material Alternatives

<b>*** 10800 - BATH (shower curtains) ***</b>								
<b>Note: PVC shower curtains have serious serious outgassing problems</b>								
Nylon	Valiant			Look for reversed bottom hem for water runoff	\$10-30	Valiant Products, Denver, CO., 800-347-2727	Direct from manufacturer	<a href="http://www.valiantproducts.com">www.valiantproducts.com</a>
Polyethylene	Brookstone Tyvek				\$20	Brookstone, 800-846-6097	Brookstone Stores, San Francisco, 415-731-8046, 415-546-6667; Concord, CA, 925-609-7138	<a href="http://www.brookstone.com">www.brookstone.com</a>
Polyester	A-1 Textiles		Pro: breathable		<\$10 wholesale	Chatsworth, CA, 800-351-1819	Direct frm manufacturer	<a href="http://www.a-1textiles.com">www.a-1textiles.com</a>
Cotton	many		Con: requires more care (regular washing and airing) to keep mold free	Pro: renewable resource, available in organic cotton	\$15-60			
Cotton Duck Canvas	Green Home, Real Goods		Pro: better at resisting absorpition of water than regular cotton		\$26 - 90	Green Home 415.282.6400		<a href="http://www.greenhome.com">www.greenhome.com</a>
Glass	many	rigid door						
none		design open shower without curtain						
<b>*** 12490 - WINDOW TREATMENTS *** See 9700 wall coverings for more discussion of fabrics</b>								
<b>*** 12500 - FURNITURE *** See 9700 wall coverings for more discussion of fabrics</b>								
Wool/ Ramie	Climatex Lifecycle	Wool/Ramie blend, no carcinogens, toxic chemicals or heavy metals		*Pro: low impact manufacture, compostable at end of life		Carnegie Fabrics 800-727-6770, Rockville Centre, NY, 516-678-6770	Nancy Dul, Sausalito, CA, 415-339-9112	<a href="http://www.carnegiefabrics.com">www.carnegiefabrics.com</a>
Polyethylene	Xorel	See description above under wall coverings				Carnegie Fabrics 800-727-6770, Rockville Centre, NY, 516-678-6770	Nancy Dul, Sausalito, CA, 415-339-9112	<a href="http://www.xorel.com">www.xorel.com</a>
Natural fibers	many	Many other natural fiber and other fabric alternatives are available				DesignTex		



## PVC Free Building Material Alternatives

*** 15100 & 15400 - BUILDING SERVICES PIPING & PLUMBING (pipes)***								
HDPE (High Density Polyethylene)	CPChem Performance Pipe	High Density Polyethylene plastic often used in natural gas, water supply, sewer, perimeter drain pipe and relining applications	*Pro: light, flexible, more resilient than PVC, stronger in cold weather, joints are fused rather than glued for better seal (almost leak free) and no fumes, long continuous coils, *Con: high expansion coefficient (3X PVC) that must be accommodated in high temp fluctuation environments, not recommended for high temperature apps (140+F)	*Pro: lower embodied energy (1/3 of PVC), easy to recycle	Varies. Can be least expensive plastic (\$.40/lb for 4" compared to \$1.20 for PVC in 94, 25-35% more expensive in 2002), Fusion installation takes more time, but comes in long continuous rolls	CPChem 800-527-0662	Maskell Robbins Hayward, CA 800-638-4373	<a href="http://www.CPChem.com/performancepipe">www.CPChem.com/performancepipe</a>
HDPE	Rinker, QWH, Quail					Endot Industries 800-345-3990	P&F Distributing Bribane, CA 415-467-4630	<a href="http://www.endot.com/market">www.endot.com/market</a>
HDPE	Isco					Isco Industries, Louisville, KY, 800-345-4726	John Hancock, 559-291-4725	<a href="http://www.isco-pipe.com">www.isco-pipe.com</a>
PEX	Cross linked polyethylene					Vanguard Piping, Action Sales, San Jose, CA, 408-406-3218	Cal-Steam Plumbing Supply, Hayward, 510-633-0900	<a href="http://www.vanguardpipe.com">www.vanguardpipe.com</a>
Vitrified Clay		Fired clay used in industrial and sewer applications	*Pro: highly chemical resistant, lowest thermal expansion coefficient, most durable of all pipe materials, many manufacturers give 100 year warranties *Con: heavy	*Pro: Low toxic manufacture, non toxic disposal *Con: low embodied energy (1/3 of PVC),	comparable to PVC in 94	Clay Pipe Institute, Lake Geneva WI, 262-248-9094		<a href="http://www.ncpi.org">www.ncpi.org</a>
Vitrified Clay	Gladding Mc Bean & Co.					Gladding McBean, Lincoln CA, 916-645-9525	Groeniger, Santa Rosa 707-586-3333, Sacramento 916-455-3333, Hayward	<a href="http://www.gladdingmcbean.com">www.gladdingmcbean.com</a>

## PVC Free Building Material Alternatives

<b>Vitrified Clay</b>	<b>Mission Clay</b>					Mission Clay, Corona CA, 909- 277-4600	Mission Clay, Oakland, 510- 568-0800	<a href="http://www.missionclay.com">www.missionclay.com</a>
<b>Cast iron</b>		Primarily used in sanitary and storm drain, and soil/waste piping and venting	*Pro: low thermal expansion coefficient (1/5 of PVC), quieter, very durable	*Pro: US foundries make entirely from recycled scrap steel and iron	material up to 2X as expensive as PVC, installation can be lower	Cast Iron Soil Pipe Institute, widely available. Avoid McWane due to serious OSHA violations	widely available at plumbing supply houses	<a href="http://www.cispi.org">www.cispi.org</a>
<b>ABS (Acrylonitrile-Butadiene-Styrene)</b>	<b>not recommended due to manufacturing toxics</b>	vc	*Con: nearly twice the thermal expansion coefficient of PVC	*Con:- slightly more energy intensive to produce, seroius toxic problems in manufacture	equal to PVC for 4" pipe in 94	widely available	widely available at plumbing supply houses	

## PVC Free Building Material Alternatives

*** 16000 - ELECTRICAL CABLES ***								
Note: Insulation is frequently PVC, but has been eliminated from many subway systems internationally and from many US military applications due to fire smoke hazards								
LLDPE (Linear Low Density Polyethylene)	Belden, Carol	Low smoke polyethylene or Linear low density polyethylene, used in airports, security, military other places where smoke from a fire is high concern					Houston Wiring Cable Norwalk CA 562-623-9787	
XLPE (Thermoset Crosslinked Polyethylene)	General	substitute for XHHW-2, USE-2/RHH/RHW-2	Building wire alternate to PVC insulated THHN, XHHW for genrl purpose, color coded, USE-2 for burial or wet apps		upcharge over PVC THHN varies by size, ~50% for AWG2, less for larger, more for smaller (2001 local SF electric house)	General Cable, Highland Heights, Kentucky, 1-859-572-8000	Omni Hayward 510-887-8600; Houston Wiring Cable Norwalk CA 562-623-9787	<a href="http://www.generalcable.com">www.generalcable.com</a>
Polyolefin	Southwire	Substitute for PVC coated NM B, THHN, and THWN building wire (also datawire)				Southwire Company, Carrollton Ga., 800-444-1700	Independent Electric Supply, 415-861-8558; City Electric Supply, 415-821-3011; Maltby Electric Supply, 863-5000; Pacific Electric Supply, 415-255-6161	<a href="http://www.southwire.com">www.southwire.com</a>
*** 16000 - CONDUIT, DUCT & EMT & JUNCTION BOXES ***								
HDPE (High Density Polyethylene)	CPChem Performance Pipe	High density polyethylene (ENT)	*Pro:D69 More flexible, ductile, and resilient than PVC, stronger in cold weather, joints are fused or pressure fit rather than glued for better seal and no fumes , lower COF = easier to run cable, *Con: higher thermal expansion coef but can handle it.		varies, sometimes cheaper, currently (early 02 25-35% more expensive material costs. Similar installation. Better maintenanc+A 127e costs	Chevron Phillips Chemical (CPChem), Plano TX 800-527-0662,	P&F, Brisbane, 415-467-4630	<a href="http://www.CPChem.com/performancepipe">www.CPChem.com/performancepipe</a>

## PVC Free Building Material Alternatives

HDPE	Arncos PermaGuard					Arncos, Elyria, OH 800-321-7914	Graybar, San Francisco, 415-970-5445; Wesco, 415-865-3917	<a href="http://www.arncocorp.com">www.arncocorp.com</a>
HDPE	Endot					Endot Industries, Rockaway NJ, 800-443-6368	Graybar, San Francisco, 415-970-5445; CSC, 510-818-7111	<a href="http://www.endot.com/market">www.endot.com/market</a>
HDPE	Vikimatic					TVC Communications San Clemente, CA 1-800-755-1415		<a href="http://tvccatalog.tvcinc.com">http://tvccatalog.tvcinc.com</a>
HDPE	Lamson & Sessions	Most L&S product line is PVC. Just beginning to offer HDPE				Lamson & Sessions, Cleveland OH, 216-464-3400	Electrigrup CA 562-981-8340; Maltby 415-863-5000; Independent Electric Supply 415-861-8558	<a href="http://www.lamson-sessions.com">www.lamson-sessions.com</a>
Galvanized Steel or Aluminum	Allied Tube	Conduit (EMT)				Allied Tube, Harvey IL 800-882-5543, widely available	Any electric supply house	<a href="http://www.alliedtube.com">www.alliedtube.com</a>
Fiberglass	Champion	can replace PVC coated conduit in corrosive environments. Also make trays	Pro: low coefficient of friction			Champion Fiberglass, Spring, TX 281-353-5052	Any electric supply house	<a href="http://www.championfiberglass.com">www.championfiberglass.com</a>
Fiberglass Reinforced Epoxy	FRE					FRE Composites, Quebec Canada, 888-849-9909, 503-799-6610	Maltby 415-863-5000; Independent 415-861-8558	<a href="http://www.frecomposites.com">www.frecomposites.com</a>
Nylon	Sealcon Standard and Superflex	liquid tight flexible conduit				Sealcon Centennial, CO (303) 699-1135	Quail Electronics, Livermore 925-373-6700	<a href="http://www.sealconusa.com">www.sealconusa.com</a>

## PVC Free Building Material Alternatives

<b>Nylon</b>	<b>Liquitite Corrllok</b>	liquid tight flexible conduit				Electri-Flex, IL (800) 323-6174	Maltby 415-863-5000; Independent 415-861-8558	<a href="http://www.electriflex.com">www.electriflex.com</a>
<b>Coated steel</b>	<b>Type ATX, ZHLA, CEA or ACEA</b>	liquid tight flexible conduit - steel with polyurethane				Electri-Flex, IL (800) 323-6174	Maltby 415-863-5000; Independent 415-861-8558	<a href="http://www.electriflex.com">www.electriflex.com</a>

## PVC Free Building Material Alternatives

*** OTHER materials still to come***								
Signage								
Molding								
Divider panels								
Furniture								
Shade & blinds								
Weatherstrip								
Gutters & downspouts								
Flashing								

This list is intended to provide a representative sampling of products and materials that are commercially available for a variety of applications. It is not intended to be comprehensive and in a rapidly changing market, the completeness and accuracy of this information cannot be guaranteed. Inclusion on this list does not imply endorsement by HBN of any product or manufacturer, nor any warranty of the appropriateness of listed products for a particular application. Replication of this information for educational purposes is permitted with credit to HBN and the inclusion of these disclaimers.

last updated 6/16/03

© Healthy Building Network

[www.healthybuilding.net](http://www.healthybuilding.net)



# Alternatives\* to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices

## Products detailed in this publication include:

### Ambulatory Products

### Bedding Products

### Blood Bags:

- fresh frozen plasma
- packed red blood cells
- platelets
- platelet rich plasma

### Body Bags

### Breast Pump Collection Kits

- tubing

### Central Line Catheters and PICC Lines

- central venous catheters
- introcan safety catheters
- midline catheters
- percutaneous catheter introducers
- peripherally-inserted central catheters (PICC)

### Dialysis Peritoneal

- Cruz catheters
- rigid dialysate containers
- peritoneal catheters

### Enteral Feeding Sets

- bags and tubing
- extension sets

### Enteral Feeding Nasogastric Tubes

- gastrostomy tubes
- nasenteric tubes
- nasogastric tubes
- nasojejunal tubes
- pediatric clear straight catheters
- PEG tubes

### Epidural Vessel Catheters

### Gloves, Examination

### Intravenous (IV) Products

- administration sets
- anti-coring needles
- IV bags
- IV tubing

### Irrigation/Drainage

- drains
- irrigation containers
- mediastinal catheter
- nephrostomy catheters
- surgical and wound drains
- thoracic catheters

### Patient ID Bracelets

### Plastic Wrap

### Respiratory Therapy Products

- Berman airways
- Cricothyrotomy kits
- endotracheal tubes
- epistaxis catheters
- intubation sets
- laryngectomy tubes
- masks, aerosol and oxygen
- nasal and turbinate stents
- oxygen hoods
- Replogle suction catheter
- sleep apnea tubes
- tracheostomy tubes
- voice prosthesis products

### Saliva Ejector

### Sequential Compression Devices

### Shower Curtains

### Splints

### Sterilization Bags

- pouches

### Sump Tubes

- Salem sump tube
- Replogal sump tube

### Total Parenteral Nutrition

- bags
- catheters
- tubing

### Tubing

- IV tubing
- medical and surgical

### Umbilical Vessel Catheters

### Urinary Drainage Catheters

- Foley catheters
- urethral catheters for pediatrics
- urinary catheters

\* Health Care Without Harm does not endorse any of these products, has not tested them for safety or efficacy, and does not take responsibility for the accuracy of the information or product performance. Listing here is based solely on information provided by the manufacturer. Non-PVC products may contain much smaller amounts of DEHP. Flexible PVC-free products still must be tested to ascertain whether they are in fact DEHP-free. Products that contain latex and chlorine are excluded from this table: latex products because of concerns over latex allergies and chlorine containing products because of concerns over lifecycle hazards. Exceptions are made for the few PVC products for which few or no non-PVC products are available. In those cases non-DEHP products are identified. This table is a work-in-progress.

**Sources:** Sustainable Hospitals Project, 2000, "Alternative Products," see <http://sustainablehospitals.org> (Lowell: Sustainable Hospitals Project, UMass Lowell); and Tickner, Joel, et al, 1999, The Use of Di-2-Ethylhexyl Phthalate in PVC Medical Devices: Exposure, Toxicity, and Alternatives (Lowell: Lowell Center for Sustainable Production, UMass Lowell). All information was verified through telephone contacts with manufacturer representatives or review of manufacturer website information.

## Alternatives to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices (Part 1 of 6)

Products	Manufacturer	Telephone	Webpage	Material	Comments
<b>Ambulatory Products</b>	Many Manufacturers, including: Merry Walker Corp.	815.678.3388	www.merrywalker.com	Steel	Merry Walker
<b>Bedding Products</b>	Children's Medical Ventures	800.377.3449	www.childmed.com	Polyurethane	Soft Gel pillow - neonates
	LASAN Plastics, Inc.	603.330.0700	www.lasan.com	Polyethylene	Bedding materials
	Precision Dynamics Corp.	800.847.0670	www.pdcorp.com	Polyethylene	Disposable mattress and pillow covers, draw sheets
<b>Blood Bags</b>	Baxter Healthcare	800.766.1077	www.baxter.com	Polyolefin	Bags for platelets, platelet rich plasma and fresh frozen plasma
	Baxter Healthcare	800.766.1077	www.baxter.com	Non-DEHP PVC	Bags for packed red blood cells
<b>Body Bags</b>	LASAN Plastics, Inc.	603.330.0700	www.lasan.com	Polyethylene/Polypropylene blend	
	ICP Medical	314.429.1000 ext. 22	www.icpproducts.com	Polyethylene	
<b>Breast Pump Collection Kits</b>	CAMP (Expressly Yours)	800.492.1088	www.expresslyyours.net	Silicone	Collection kit
					Tubing
<b>Central Line Catheters and PICC Lines</b>	B. Braun	800.227.2862	www.bbraunusa.com	Polyurethane or Teflon	Percutaneous catheter introducers, Central venous catheter, Introcan safety catheter
	Becton Dickinson	201.847.6800	www.bd.com	Silicone, Polyurethane or Teflon	Peripherally-inserted central catheter, Midline catheter
	Horizon Medical Products	800.472.5221	www.hmpvascular.com	Silicone	Central venous catheter, Peripherally-inserted central catheter
	Klein-Baker Medical	210.696.4061	www.neocare.com	Silicone	Peripherally-inserted central catheter - neonates
	Utah Medical Products, Inc.	800.533.4984	www.utahmed.com	Silicone	Peripherally-inserted central catheter - neonates (PICC-Nate)
	Vygon	800.544.4907	www.vygonusa.com	Polyurethane or Silicone	Peripherally inserted central catheter - adults and neonates
	Vygon	800.544.4907	www.vygonusa.com	Polyurethane	Mid-line catheters - pediatrics and adults
<b>Dialysis, Peritoneal</b>	B. Braun	800.621.0445	www.bbraunusa.com	Polypropylene/Polyethylene comonomer	Rigid peritoneal dialysate container
	B. Braun	800.621.0445	www.bbraunusa.com	Silicone	Peritoneal catheter - infants and adults

## Alternatives to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices (Part 2 of 6)

Products	Manufacturer	Telephone	Web Page	Material	Comments
<b>Dialysis, Peritoneal (continued)</b>	CORPAK MedSystems	800.323.6305	www.corpakmedsystems.com	Polyurethane	Cruz catheter
	Degania Silicone	401.658.0130	www.deganiasilicone.com	Silicone	Peritoneal catheter
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Silicone	Peritoneal catheter
	Horizon Medical Products	800.472.5221	www.hmpvascular.com	Silicone	Peritoneal catheter
	Phoenix Biomedical Corp.	800.462.2563	www.shunt.com/biomedical	Silicone	Peritoneal catheter - neonatal to adult
	Children's Medical Ventures	800.377.3449	www.childmed.com	Non-DEHP PVC	Enteral set
<b>Enteral Feeding Sets</b>	CORPAK MedSystems	800.323.6305	www.corpakmedsystems.com	Nylon, Ethylene vinyl acetate, Polypropylene	Enteral feeding bag
	CORPAK MedSystems	800.323.6305	www.corpakmedsystems.com	Nylon and Ethylene vinyl acetate	Farrell valve for enteral gastric pressure relief: PVC-free bag with tubing made from PVC with DEHP
	CORPAK MedSystems	800.323.6305	www.corpakmedsystems.com	Silicone	Cubby button gastrostomy device (CorFlo)
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Non-DEHP PVC	Non-DEHP bag & tube
	CORPAK MedSystems	800.323.6305	www.corpakmedsystems.com	Silicone	Gastrostomy tube - neonates and adults
	CORPAK MedSystems	800.323.6305	www.corpakmedsystems.com	Polyurethane	PEG tube, Nasoenteric feeding tube, Jejunal tube - neonates and adult
<b>Enteral Feeding – Nasogastric (NG) Tubes</b>	C.R. Bard, Inc.	800.545.0890	www.bardmedical.com	Polyurethane	Pediatric clear straight catheter
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Polyurethane	Nasogastric tube, PEG tube, Nasojejunal
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Silicone	Replacement skin level g-tube
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Silicone	Gastrostomy tube
	Kimberly-Clark (Ballard Medical Devices)	800.524.3557	www.khealthcare.com	Silicone	PEG feeding tube, Gastrostomy feeding tube, Jejunal feeding tube
	Klein-Baker Medical	210.696.4061	www.neocare.com	Silicone	Feeding tube for neonates
	Ross (Abbott Laboratories)	800.231.3330	www.ross.com	Polyurethane	Gastrostomy tube, Nasoenteric feeding tube, Nasojejunal feeding tube
	Ross (Abbott Laboratories)	800.231.3330	www.ross.com	Silicone	Gastrostomy tube -- adult and pediatric, PEG tube
	Utah Medical Products Inc.	800.533.4984	www.utahmed.com	Silicone	Nasogastric and nasoenteric feeding tubes (Gesco Nutri-cath)

## Alternatives to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices (Part 3 of 6)

Products	Manufacturer	Telephone	Web Page	Material	Comments
<b>Enteral Feeding – Nasogastric (NG) Tubes (continued)</b>	VYGON	800.544.4907	www.vygonusa.com	Polyurethane	Gastric feeding tube for infants, Nasojejunal tube
	ZeVex	800.970.2337	www.zevex.com	Polyurethane	Nasoenteric feeding tube
	ZeVex	800.970.2337	www.zevex.com	Silicone	Gastrostomy tube
<b>Epidural Vessel Catheters</b>	B. Braun	800.227.2862	www.bbraunusa.com	Polyamide (nylon)	Epidural vessel catheter
	VYGON	800.544.4907	www.vygonusa.com	Polyethylene, Polyamide (nylon) or Polyurethane	Epidural vessel catheter
<b>Gloves, Examination</b>	Allegiance Healthcare Corp.	800.964.5227	www.allegiance.net	Nitrile	
	Ansell-Perry	800.321.9752	www.ansellhealthcare.com	Nitrile	
	Best Manufacturing Co.	800.241.0323	www.bestglove.com	Nitrile	
	ECI Medical Technologies	800.668.5289	www.ecimedical.com	Styrene isoprene styrene	
	Maxxim Medical	800.727.7951	www.maxximmedical.com	Polyurethane	
	Safeskin Corporation	800.462.9993	www.safeskin.com	Nitrile	
	SmartCare Inc.	800.822.8956	www.smartcare.com	Nitrile	
	Tillotson	800.445.683	www.thcnet.com	Nitrile	
	B. Braun	800.227.2862	www.bbraunusa.com	Polypropylene/Polyethylene copolymer, Polyester, Elastomer laminate	Bags for IV solutions and pre-mixed drug solutions (Excel)
<b>Intravenous (IV) Bags and Tubing</b>	B. Braun	800.227.2862	www.bbraunusa.com	Polypropylene/Polyethylene copolymer	Partial additive bag for IV solutions and pre-mixed drug solutions (PAB)
	B. Braun	800.227.2862	www.bbraunusa.com	Polyethylene, Polypropylene, Foil, and other special barriers	Two-chamber bag - one chamber antibiotic powder, the other diluent (Duplex)
	Biometrix	972.2.586.1322	www.biometrix.co.il	Polyethylene	IV sets
	Budget Medical Products	800.569.1620	www.icumed.com	Non-DEHP PVC	IV tube
	Children's Medical Ventures	800.377.3449	www.childmed.com	Non-DEHP PVC	IV administration sets
	Curlin Medical	714.893.2200	www.curlinmedical.com	Non-DEHP PVC	Infusion tube, Extension sets
	Cryovac	864.433.2000	www.cryovac.com	Polyolefins	IV bag
	Kawasumi	800.529.2786	www.kawasumiamerica.com	Non-DEHP PVC	Port access infusion sets
	Kawasumi	800.529.2786	www.kawasumiamerica.com	Non-DEHP PVC	Gravity IV administration sets

## Alternatives to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices (Part 4 of 6)

Products	Manufacturer	Telephone	Web Page	Material	Comments
<b>Intravenous (IV) Bags and Tubing (continued)</b>	Horizon Medical Products	800.472.5221	www.hmpvascular.com	Non-DEHP PVC	Anti-coring needles
	MPS Acacia	800.486.6677	www.mpsacacia.com	Non-DEHP PVC	IV tubing
	Medex, Inc.	800.848.1757	www.medexmed.com	Polyurethane	IV extension set
	Medex, Inc.	800.848.1757	www.medexmed.com	Polyethylene	IV tubing
	Natvar	909.594.3660	www.natvar.com	Polyurethane	Multi-layer IV tubing (BioPath)
	Pactiv	847.482.2000	www.pactiv.com	Polypropylene	IV bag
	Cryovac	864.433.2000	www.cryovac.com	Polyolefins	IV bag
<b>Irrigation/Drainage</b>	Atrium Medical Corporation	800.528.7486	www.atriummed.com	Silicone	Thoracic catheter
	B. Braun	800.227.2862	www.bbraunusa.com	Polyethylene/Polypropylene copolymer	Containers for irrigation/urology solutions (PIC)
	Biometrix	972.2.586.1322	www.biometrix.co.il	Silicone	Drains
	C.R. Bard	800.545.0890	www.bardmedical.com	Silicone	Drains
	Degania Silicone	401.658.0130	www.degianasilicone.com	Silicone	Surgical and wound drains, Thoracic catheter, Nephrostomy catheter - may fit neonates
	Kendall Healthcare (Tyco)	800.962-9888	www.kendallhq.com	Silicone	Mediastinal catheter, Thoracic catheter
	Utah Medical Products, Inc.	800.533.4984	www.utahmed.com	Silicone	Thoracic catheter
<b>Patient ID Bracelets</b>	Precision Dynamics Corp.	800.847.0670	www.pdcorp.com	Tyvek®	Appropriate for short stays
	Wristband & Medical Specialty Products	800.940.3993	www.wristbandsupply.com	Tyvek®	Appropriate for short stays
<b>Plastic Wrap</b>	Glad	800.835.4523	www.glad.com	Polyethylene	Wrap (Glad Cling Wrap)
<b>Respiratory Therapy Products</b>	Kendall Healthcare	800.962.9888	www.kendallhq.com	Polyurethane	Replogle suction catheter
	Portex, Inc. (Bivona)	800.258.5361	www.portexusa.com	Silicone	Tracheostomy tubing - neonatal, pediatric, and adult
					Laryngectomy tubing - adult
					Sleep apnea tubing - adult
					Endotracheal tubing - neonate, pediatric, and adult

## Alternatives to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices (Part 5 of 6)

Products	Manufacturer	Telephone	Web Page	Material	Comments
<b>Respiratory Therapy Products (continued)</b>	Portex, Inc. (Bivona)	800.258.5361	www.portexusa.com	Silicone	Epistaxis catheters
					Nasal and turbinate stents - adult Voice prosthesis products
					Emergency circhothyrotomy kits - pediatric and adult
					Bronchoscopy tubing
					Laryngoscopy tubing
	Rusch	800.553.5214	www.ruschinc.com	Red rubber or Silicone	Reusable endotracheal tube
	Rusch	800.553.5214	www.ruschinc.com	Polyethylene	Berman Airways
	Utah Medical Products, Inc.	800.533.4984	www.utahmed.com	Co-polyester - Polyethylene foam and Polypropylene	Disposable infant oxygen hood
	Utah Medical Products, Inc.	800.533.4984	www.utahmed.com	Polyethylene terephthalate glycol	Disposable Infant Oxygen Hood (Disposa-Hood)
	Vital Signs	800.932.0760	www.vital-signs.com	Polyester	Oxygen or aerosol applications - Aero2Mask
	Vygon	800.544.4907	www.vygonusa.com	Ethylene vinyl acetate	Oropharyngeal airway - pediatric
	J.H. Orsing AB	46.42.295500	www.orsing.se	Polyethylene and Polypropylene	Saliva Ejector
<b>Sequential Compression Device</b>	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Polyolefins	
<b>Shower Curtains</b>	Brookstone	800.846.3000	www.brookstone.com	Tyvek®	
	Many manufacturers			Nylon	
<b>Splints</b>	Faretec	440.285.4020	www.faretec.com	Aluminum and Epoxy	Various splints
<b>Sterilization Bags</b>	General Econopak	888.871.8565	www.generaleconopak.com	Polyolefin/Kraft paper	Sterilization pouches
<b>Sump Tubes</b>	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Silicone	Salem sump tubes
	Vygon	800.544.4907	www.vygonusa.com	Polyurethane	Sump tubes
<b>Total Parenteral Nutrition (TPN)</b>	Baxter Healthcare, Fenwal Division	800.766.1077	www.baxter.com	Ethylene vinyl acetate	TPN bag
	B. Braun	800.227.2862	www.bbraunusa.com	Polypropylene/Polyethylene copolymer, Polyester, Elastomer laminate	Bag for sterile water (Excel)
	B. Braun	800.227.2862	www.bbraunusa.com	Glass container	TPN solution in glass container
	Biometrix	972.2.586.1322	www.biometrix.co.il	Ethylene vinyl acetate	TPN bag



## Alternatives to Polyvinyl Chloride (PVC) and Di(2-Ethylhexyl) Phthalate (DEHP) Medical Devices (Part 6 of 6)

Products	Manufacturer	Telephone	Web Page	Material	Comments
<b>Total Parenteral Nutrition (TPN) (continued)</b>	VYGON	800.544.4907	www.vygonusa.com	Polyurethane	Catheter for parenteral nutrition and mid/long-term IV therapy (see PICC lines above)
<b>Tubing – Medical and Surgical</b>	Degania Silicone	401.658.0130	www.deganiasilicone.com	Silicone	Medical tubing
	Natvar	909.594.3660	www.natvar.com	Polyurethane	Multi-layer IV tubing (BioPath)
	Tygon, Saint-Gobain Performance Plastics	800.798.1544	www.tygon.com	Polyurethane and silicone	Medical and surgical tubing
<b>Umbilical Vessel Catheters</b>	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Polyurethane	Umbilical vessel catheter
	Klein-Baker Medical	210.696.4061	www.neocare.com	Silicone or Polyurethane	Umbilical vessel catheter
	Utah Medical Products, Inc.	800.533.4984	www.utahmed.com	Silicone, Tecoflex, Polyurethane	Umbilical vessel catheter - neonates (Umbili-cath)
	VYGON	800.544.4907	www.vygonusa.com	Polyurethane	Umbilical vessel catheter
<b>Urinary Catheters</b>	C.R. Bard	800.545.0890	www.bardmedical.com	Polyurethane	Urethral catheter - pediatrics
	C.R. Bard	800.545.0890	www.bardmedical.com	Silicone	Foley catheter
	Degania Silicone	401.658.0130	www.deganiasilicone.com	Silicone	Foley catheter
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Silicone	Foley catheter
	Kendall Healthcare (Tyco)	800.962.9888	www.kendallhq.com	Polyurethane	Pediatric urinary catheter
	Klein-Baker Medical	210.696.4061	www.neocare.com	Silicone	Urinary drainage catheter - neonates
	Rochester Medical	800.243.3315	www.rocm.com	Silicone	Foley catheter (pediatric and adult)
	Utah Medical Products, Inc.	800.533.4984	www.utahmed.com	Silicone	Urinary catheter (Uri-cath)



1755 S Street, NW  
Suite 6B  
Washington, DC 20009  
Phone: 202.234.0091  
Fax: 202.234.9121  
www.noharm.org  
info@hcwh.org

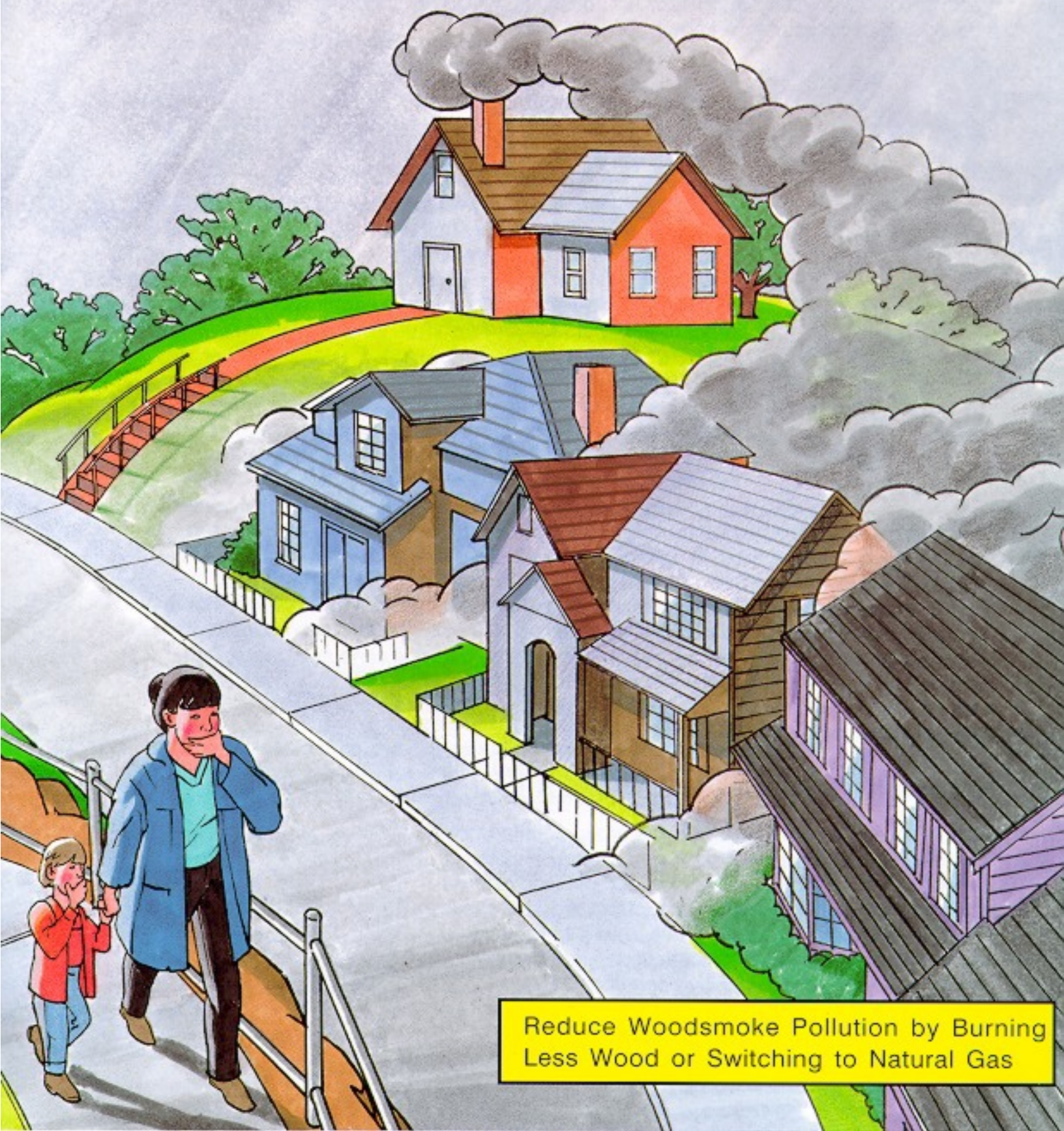
This publication is part of *Going Green: A Resource Kit for Pollution Prevention in Health Care*. For additional copies of this or other publications included in the kit, or to find out how to get a complete kit, visit Health Care Without Harm on the Web at [www.noharm.org/goinggreen](http://www.noharm.org/goinggreen).



The PCF certification mark and term are the sole property of the Chlorine Free Products Association and are only used by authorized and certified users.



# WOODBURNING HANDBOOK



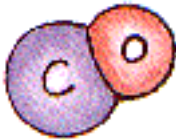
Reduce Woodsmoke Pollution by Burning  
Less Wood or Switching to Natural Gas



# What *is* Woodsmoke? It's AIR POLLUTION!

## It's Also Fuel from Your Firewood Which Has Escaped Burning...

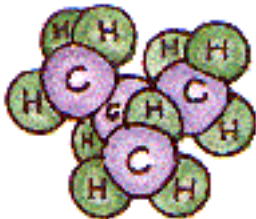
Complete combustion gives off light, heat, and the gases carbon dioxide and water vapor. Burning wood produces the above, **and**, because wood burns only partially in most cases, it also produces **the following major air pollutants**, which are regulated by State and federal rules because of their known health effects:



**CO - carbon monoxide** - odorless, produced in large amounts by burning without enough air, **CO reduces the blood's ability to supply oxygen to body tissues**. Small amounts in the air can stress your heart and reduce your ability to exercise. Those most at risk from CO poisoning are the unborn child, and people with heart, circulatory or lung disease, or anemia.



**NO<sub>2</sub> - nitrogen dioxide** - impairs proper functioning of the respiratory system and its ability to fight infection. NO<sub>2</sub> and NO also combine with VOCs to make **ozone** and with water vapor to form **acid rain** or acid fog.



**VOCs - Volatile Organic Compounds** - evaporated carbon compounds (**some toxic - see below**) which react with NO<sub>2</sub> and NO in sunlight to form ozone, or photo-chemical **smog**. **Ozone injures the lungs and makes breathing difficult, especially in children and exercising adults.**

Woodburning also produces **Inhalable Particulate Matter**, also known as **PM<sub>10</sub>** and **PM<sub>2.5</sub>** (solid or liquid particles 10 microns or less in diameter, and 2.5 microns or less in diameter, respectively). PM from woodsmoke consists of **droplets of condensed organic vapors** (wood tars and gases), **soot** (unburned carbon), and **ash** (unburnable minerals). Most woodsmoke particles average less than one micron (one millionth of a meter) in size and can stay airborne for weeks. These particles can travel deeply into the lungs when inhaled, causing irritation and coughing. **PM<sub>10</sub> and PM<sub>2.5</sub> particles from woodsmoke can remain trapped in your lungs for years, causing chronic lung diseases and cancer.**

## Smoke Contains Toxic Pollutants

Woodburning also produces dioxin, a group of chlorinated compounds that are among the most toxic substances known to man. In the Bay Area, one-third of the total dioxin is generated by woodburning. In addition, woodsmoke contains other irritating, toxic and/or cancer-causing substances such as benzene, formaldehyde and benzo-a-pyrene, a polycyclic aromatic hydrocarbon (PAH).



# Air Pollution Sources Increase With Population...

Air pollution affects millions of Californians every day. It damages our health, our crops, our property and our environment. Vehicles and industries produce most of the air pollution in cities. City pollution in turn blows into rural areas where it mixes with smoke from agricultural burning. **But in neighborhoods everywhere across California, residential woodburning is a growing source of localized air pollution.** Most wood heaters (woodstoves and fireplaces) release far more air pollution, indoors and out, than heaters using other fuels. **In many areas, woodsmoke significantly degrades air quality and visibility.**

The California Air Resources Board and the Bay Area Air Quality Management District are asking you to **help clear the air of woodsmoke.**



## You *CAN* Make a Difference!

### Take These Steps To Reduce Woodsmoke Pollution!

#### 1. Stop Burning Wood!

- Pollute less by finding a cleaner way to heat your home (page 13).

#### 2. Switch to a Gas Fireplace or Insert:

- Convert your fireplace to gas with a new gas fireplace insert (page 6).

#### 3. If You Must Use Wood, Burn Less Wood:

- Reduce your heating needs by weatherizing your house (page 4).
- Replace your old woodstove or fireplace with a new certified model, and get more heat and less pollution while burning less wood (page 8).

#### 4. Change the Way You Operate Your Stove or Fireplace:

- Burn only clean, seasoned wood and nonglossy white paper (page 10).
- Build small, hot fires instead of large smoldering ones (page 10).
- Burn seasoned cordwood, densified logs and firelogs (pages 6 & 9).
- Watch your chimney for smoke and have it inspected often (pages 11 & 12).
- Follow your woodheater's operating instructions carefully (page 11).

#### 5. Don't Use Your Fireplace on Spare the Air Nights

- Don't burn wood when the District issues a Spare the Air Tonight request (back cover).

#### 6. Urge Your City or County to Adopt a Woodsmoke Ordinance

- Lobby your local government to adopt the Air District's model woodsmoke ordinance to reduce future air pollution from new homes (back page).

## Smoke Hangs Around in Winter...

Cold nights, with little wind - common weather conditions in the winter months when we heat our homes - often cause smoke and other air pollution to accumulate close to the ground overnight. These stagnant conditions can last for days.

This is a big problem in California valleys. As night falls, ground level air cools and cold air also slides down the valley walls, pooling on the valley floors. With little or no wind **temperature inversions** can then occur - warm air layers act as a lid over the cold air in the valleys, trapping smoke and other air pollution close to the ground. And, as home heating systems operate mainly in the evening, **the smoke from stoves and fireplaces remains at ground level and collects overnight in the air you and your neighbors must breathe. Yes, it *DOES* seep into your homes.**



## Don't Smoke Your Neighbors Out!

Smoke from neighborhood stoves and fireplaces is a common source of both odor and reduced visibility, the air pollution problems that people complain about the most. These, plus the health-related problems caused by inhaling smoke pollutants, add up to significant health and welfare costs for individuals and the community. So be a good neighbor and limit your burning, and if you do burn, burn correctly. **But Do Not Burn Wood When the Air Quality is Poor!**





## Burning Wood Often Causes Indoor Air Pollution

The EPA has measured indoor air and in many studies found it to contain higher levels of contaminants than outdoor air. Since we spend almost 90 percent of our lives inside, this can have serious consequences for our well-being.

Poorly maintained woodstoves and fireplaces in particular can produce high levels of indoor smoke pollutants. A well-tuned fireplace or EPA-certified stove will still release some pollutants to the air inside your house. Even if you don't burn wood, studies have shown that woodsmoke from neighbors can enter your home and reach up to 70 percent of outdoor levels.

Woodsmoke can aggravate cardiopulmonary health conditions, like asthma and emphysema, and there is evidence linking prolonged exposure to cancer. Respiratory symptoms are particularly pronounced in children younger than five, who have smaller lungs and breathe more often than adults.

**Remember, if you can smell smoke, you have a problem.**



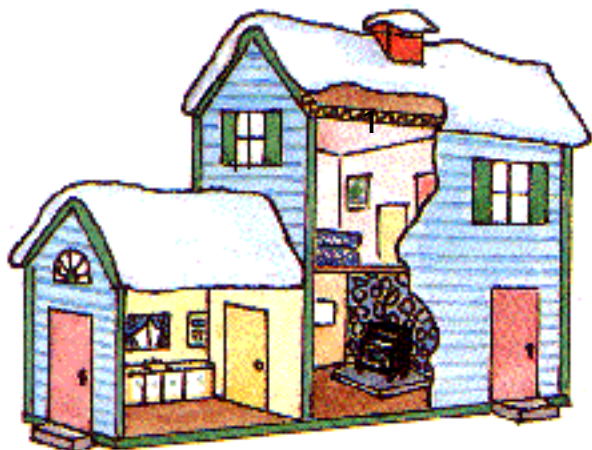
## Where Does Your Heat Go?

### The Importance of Insulation and Weather-Stripping

Heated air is always escaping from your house, and is replaced by unheated outdoor air. The typical house has one-half to two air exchanges per hour, and more on windy and/or very cold days. If your house has little insulation and many air leaks, you are paying to heat the outdoors. **And if the outside air is smoky, soon your air inside will be, too.**

**Some air exchange is necessary** because of the many sources of air pollution in the home (wood heater, gas stove, consumer products, cigarettes, etc.) And sufficient fresh air inlets are needed to replace air forced out of the house by exhaust fans, the dryer, furnace, water heater, or wood fire. **But you can reduce your heating needs if you:**

**Install Ceiling Insulation (Very Important)** - because hot air rises, **much heat is lost** through the ceiling and roof. Wall and floor insulation also reduce heat loss. Recommended amounts have increased in recent years, so be sure your house has all it needs.



**Caulk** around all windows, doors, pipes, **any** opening into the house.

**Weather-strip** all door and window openings, and consider installing double-paned glass, outdoor or indoor storm windows, and/or insulated curtains.

**Close the damper tightly** when the heater is not in use. Stoves and fireplaces allow air to leak out of the house even when they are not operating, unless they are **literally** airtight.

**Close off unused rooms** if you don't use central heating - don't waste the heat.



# Most Fireplaces and Old Woodstoves Are *EXPENSIVE* Heaters Because They Turn a Large Part of Your Firewood Into Smoke, Not Heat!

## Why Does This Happen? Because of the Way Wood Burns—



Wood burns **completely** only at **very high temperatures** with enough **oxygen** present. The fuel, heat, and oxygen have to mix together in the same place at the same time. Although all stages of burning actually occur at the same time on a burning log, let's place a "demonstration" log on a hot fire. As temperature rises, it will "burn" in three stages:

1. **Boil Off Water** - moisture in the log evaporates as it heats up, and hisses and bubbles out through the log's surface as water vapor. This takes longer and **uses up lots more heat energy** if the log isn't really dry. That heat energy could be warming your house instead of drying your wood before it will burn.



2. **Vaporize Wood Gases** - before burning, firewood "cooks" and forms hundreds of new volatile organic gases and tars plus charcoal (carbon). The gases and tars, a large part of your fuel, vaporize in the heat and stream out of the log in a "wind" of organic gases. **They escape up the flue** because the log temperature at this stage is too low to burn them. As they cool, some of the gases will combine with water vapor to form highly flammable creosote that sticks to the flue walls; other gases condense into smoke particles.



3. **Burn Log Charcoal** - above 600° F the log "catches fire" and the escaping gases start burning, ignited by nearby flames, but the log charcoal doesn't start to burn and emit heat until the log reaches 1000° F. **Burning the charcoal remainder of the log produces most of the fire's usable heat.** Most of the log's gases and tars will escape unburned; there's still not enough heat or oxygen close to the log's surface to burn them. They don't ignite before reaching 1100° F, and then **only** with enough **oxygen** present.



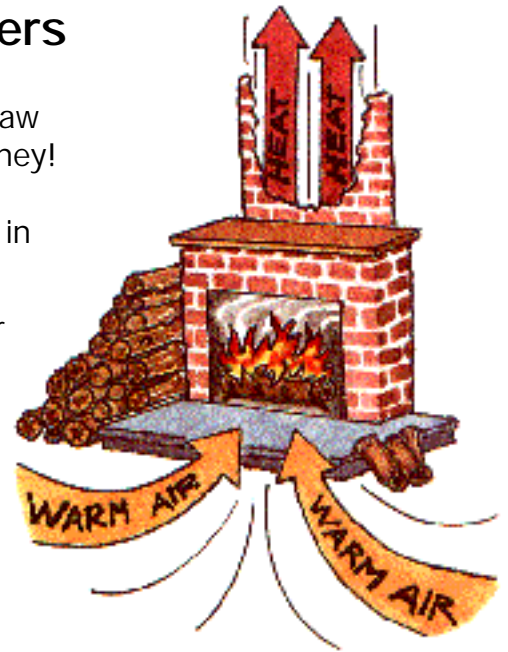
The PM<sub>10</sub> pollution from *one* old woodstove, emitting 60 grams/hour of PM<sub>10</sub>, equals that of *ten* EPA certified stoves (averaging 6 grams/hour PM<sub>10</sub>), or that of *three thousand* gas furnaces - producing the same amount of heat.

# Most Fireplaces Are *NOT* Good Heaters

**Most fireplaces rob your house of heat** because they draw in lots of the air you've paid to heat and send it up the chimney! Yes, you'll be warmed if you sit within six feet of the fire, but the rest of your house is getting **colder** as outdoor air leaks in to replace the hot air going up the chimney.

**Most fireplaces waste wood** because with unrestricted air flow, the vaporized wood gases and tars cooked out of your logs go right up the chimney as **smoke**. And all that air helps the fire **burn fast**, so a load of wood lasts only one or two hours.

**Most fireplaces can pollute *more*** if you install glass doors or a fireplace insert that is not a new, certified clean-burning model. Restricting the air supply reduces the available oxygen and causes the fire to smolder and smoke.



## You *CAN* Clean Up Your Air Guzzling Fireplace!

**Switch to Gas.** Gas fireplaces are gaining in popularity. The new models look like a real wood fire! They are self-contained units which can be fitted into your existing masonry fireplace. They send less of your heated air up the chimney.

**This equipment burns cleaner, is easy to start, convenient, safe and inexpensive to operate, and is a good source of heat.**



**Certified Woodburning Fireplace Inserts** have been developed which meet federal emission standards and provide high fuel efficiency. They are available in many sizes and styles to fit into your masonry fireplace. **They provide excellent fire viewing and heat output with very little smoke.**

**Burn Manufactured Fireplace Logs.** Reduce heat loss and air pollution from your fireplace by burning **firelogs**. Made of dry, fine-particle sawdust **and wax**, these "logs" burn slowly at high temperatures, producing less smoke and sending less air up the chimney. Underwriters Laboratories (UL) recently classified firelogs as safe to burn in UL listed factory built fireplaces. **Firelogs are not recommended for use in woodstoves, however.**



## How Much Heat You Get

The **heating efficiency** of any wood heater depends on combining two factors:

1. **How completely it burns the firewood** (combustion efficiency); plus
2. **How much of the fire's heat gets into the room**, rather than going up the flue (transfer efficiency).

**How efficiently your wood heater operates** depends on 2 more factors:

1. **Its installation** - located on an outside wall? Too big for house? Flue draws well?
  2. **Its operation** - Wood green? Stove stuffed with wood? Fire starved for air?
- Your operating techniques account for the largest variations in your woodstove's heating efficiency.**

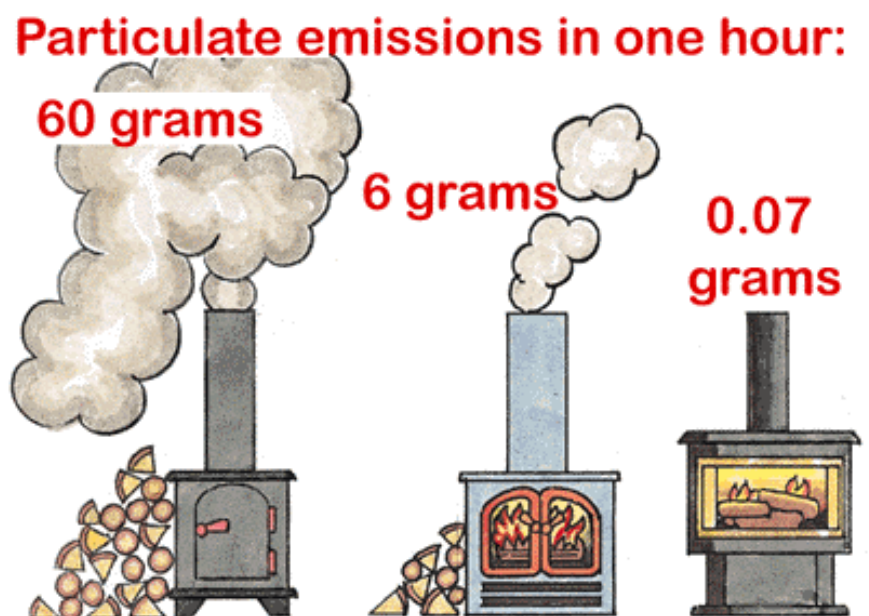
HEATING EFFICIENCY	
Masonry Fireplace	-10% to 10%
Manufactured Fireplace	-10% to 10%
Freestanding Fireplace	-10% to 30%
Antique Stove	20% to 40%
Fireplace Insert	35% to 50 %
Airtight Stove	40% to 50%
Masonry Heater	50% to 70%
Certified Stoves, Inserts, Fireplaces	60% to 80%
Gas Heater	60% to 90%
Electric Heater	100%

## Heat With Gas or Get a New EPA-Certified Stove—

Old stoves *WASTE* 30% to 60% of your wood. If your woodstove is more than a few years old and is not EPA-certified, you should seriously consider buying a new certified woodstove.

It will burn *ALL* of your wood, increasing combustion efficiency, producing far less smoke and creosote buildup, and reducing air pollution.

It incorporates the latest and best technology available on transfer efficiency, and will provide more heat for your house and less for your flue!

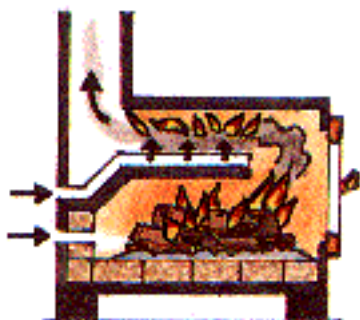
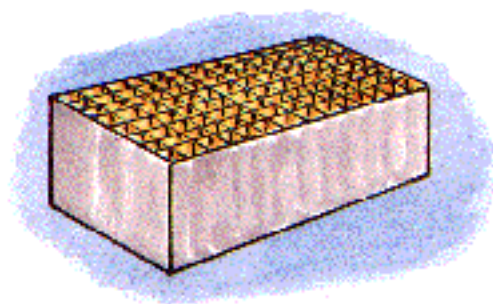




## EPA Certified Woodstoves Heat More and Pollute Less

The EPA has been regulating woodstoves and fireplace inserts since 1988. New stoves manufactured in the US must be EPA-certified. These stoves heat better with less wood, because they burn more of the combustible gases that would otherwise escape as woodsmoke. There are three basic EPA-certified stove designs:

**Catalytic Stoves** - similar to the smog device on new cars, the catalytic combustor in these stoves allows the volatile gases to burn at lower temperatures. Smoke passes through a ceramic honeycomb coated with a rare-metal catalyst, which allows complete smoke combustion and heat release at 500-700° F. Their efficiency does drop over time and the catalyst device requires replacement after three to seven years of use.



**Noncatalytic Stoves** - these stoves are designed with baffles and/or secondary combustion chambers which route the burnable gases through the hottest part of the firebox and mix them with sufficient air to burn them more completely.

## Pellet Stoves Burn Cleaner Than Cordwood Stoves

The most efficient and least polluting of the new stove designs, most are exempt from certification because they provide excess combustion air. Most have some moving parts and require electricity. The pelleted fuel (compressed wood waste) automatically feeds into the firebox. A fan blows in combustion air and the fire burns hot and clean. Another fan blows room air through a heat exchanger and into the room.



## Look for the Permanent EPA Label on the Stove Before You Buy!

For maximum safety and efficiency have a professional installer calculate the correct stove size for the area you want to heat, install the stove, and design and install the chimney.

# Follow These Tips on Clean Burning—

## Heat More Efficiently *AND* Reduce Air Pollution!

### 1. Burn a Mix of Softwoods, Hardwoods, Pressed Logs

#### Start Your Fire With Softwood Kindling

**Softwoods** (pine, fir) are generally low in density, ignite easily, burn fast and hot and will heat the firebox and flue quickly. They're ideal for kindling and starting your fires but **form creosote easily** due to the high resin (sap) content.



#### Burn Longer and Cleaner With Hardwood and/or Manufactured Densified Logs

**Hardwoods** (oak, orchard) are **denser** and take longer to ignite, but burn slower and more evenly, producing less smoke. They also **provide more heat energy** than softwood logs the same size.

**Densified logs** are compressed sawdust (no wax); at 8600 Btu/lb, they burn longer and emit 25 to 50% less PM<sub>10</sub>, CO and VOCs than burning cordwood.

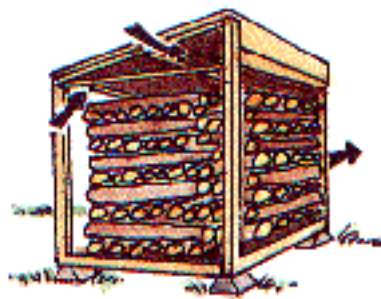


### 2. Burn Only "Seasoned" Firewood

Firewood should dry, or "season" **6 to 12 months minimum** after splitting. Hardwoods dry slower than softwoods and some may take over a year to dry. "Seasoned" firewood by definition contains 20 per cent moisture or less by weight. **The warmer the storage area, and the more air circulation, the faster the drying time.**

#### To Speed Drying:

**Split and Stack** - logs dry from the outside in, so split big logs right away for faster drying. Stack loosely in a **crosswise** fashion to get good air circulation.



**Store High & Dry** - Stack a foot or more above the ground and away from buildings in a sunny, well-ventilated area. Cover the top to keep dew and rain off the wood, but leave the sides open to breezes.

### 3. Buy Wood Advertised as "Seasoned" Carefully. Look for:



- **Dark colored, cracked ends**, with cracks radiating from the center like bicycle spokes.
- **Light in weight**, meaning there's little moisture left - but hardwood logs will weigh more than softwood.
- **Sound** - hit two pieces together. Wet wood makes a dull "thud" sound. Dry wood rings with a resonant "crack," like a bat hitting a baseball.
- **Easily peeled or broken bark**. No green should show under the bark.

### 4. Don't Burn Anything but Clean, Seasoned Wood, Manufactured Logs, and Non-Glossy White Paper

No Garbage, Plastics, Rubber, Waste Solvent, Paint or Oil, No Painted or Treated Wood, Particleboard, Plywood, or Saltwater Driftwood, No Coal or Charcoal Briquettes, and No Glossy or Colored Paper. **Burning these materials can produce noxious, corrosive smoke and fumes which may be toxic** and can foul your catalytic combustor, your flue, and the lungs of your family and neighbors. **Warning:** kiln-dried lumber vaporizes too rapidly, causing creosote buildup.



### 5. Build a Small, *HOT* Fire First To Preheat the Firebox & Chimney



- **Open Damper Wide** - allow in maximum air to fuel the fire. And leave it and other air inlets open for 30 minutes.
- **Start Small & Hot** - leave a **thin** layer of ash for insulation. Crumple a few sheets of newspaper and add some small pieces of kindling, then light. Add bigger kindling a few at a time as the fire grows. Get it burning **briskly** to form a bed of hot coals. Now add 2 or 3 logs.
- **Position the logs you add carefully** - place close enough together to keep each other **hot**, but far apart enough to let sufficient air (**oxygen**) move between them.

**Light & Refuel Your Fire Quickly and *CAREFULLY*,  
As These Are The Two Times It Will Smoke the Most.**

## 6. Refuel While the Coals Are Still Hot!

**Open** the draft controls and damper **one minute before** opening the stove door. This helps prevent backpuffing of smoke into the room.

**Preheat** again by placing a few pieces of kindling on the red hot coals. Add more as they catch fire. Add a **few** larger pieces. **Small, frequent loading smokes less than a big load in most older stoves.**



**After** refueling, leave the dampers and inlets open for about 30 minutes. The fire will get plenty of air and burn hot, retarding creosote formation (most forms early in a burn). You'll know the chimney is heated again when the new logs burn vigorously.

## 7. Maintain Your Fire Properly—Watch the Temperature

**Don't Close the Damper or Air Inlets Too Far** - the fire will smoke from lack of air.

**Follow the Stove Manufacturer's Instructions Carefully.** And be sure that **any** family member who operates the stove is also familiar with these instructions.

***YOUR ACTIONS* Determine How Efficiently Your Stove Will Operate.** A good stove is designed to burn cleanly and efficiently, but it can't do its job right if **you** don't cooperate.

## 8. Lights Out, Fires Out!

***DO NOT* Burn Overnight** - it's a major fire hazard. And it's too tempting to choke the fire for air to slow burning, and then pollute the neighborhood all night. This can also lead to backdrafting the smoke into your own home, causing very hazardous indoor air pollution.

**Build a Small, Hot Fire and Let It Burn Out Completely**, relying on your home's insulation to hold in enough heat for the night. **Then Close the Damper Tightly.**





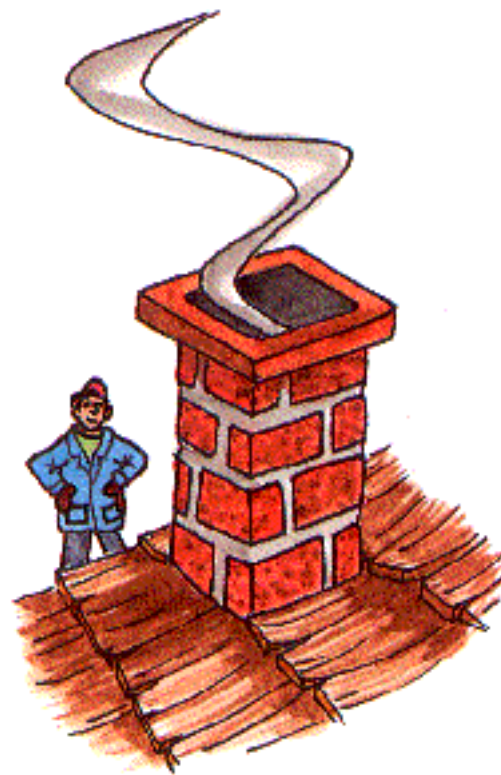
## 9. Heating in Warmer Weather

If a small space heater won't suffice, open the air controls wide and build a **small, hot fire**, using more finely split wood, and let it burn out. Trying to reduce the heat from a big fire by reducing its air supply leads to smoldering, creosote buildup and air pollution.

## 10. Watch for Smoke Signals!

Get into the habit of glancing out at your chimney top every so often. Apart from the half hour after lighting and refueling, a properly burning fire should give off only a thin wisp of white steam.

**If you see smoke**, adjust your dampers or air inlets to let in more air. **The darker the smoke, the more pollutants it contains** and the more fuel is being wasted.



## 11. Inspection and Upkeep - For Safety's Sake

Periodic **inspection** of your stove or fireplace is **essential** to ensuring its continued safe and clean-burning operation. Be sure you carefully check, and repair as needed, the:

- **Chimney Cap** can be plugged by debris which will reduce draft.
- **Chimney** should be cleaned professionally **at least once a year** to remove creosote buildup.

**Catalytic Combustor** holes can plug up; follow instructions to clean.

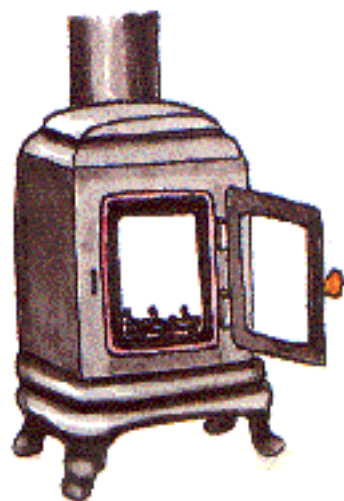
**Stovepipe** angles and bolts are particularly subject to corrosion.

**Gaskets** on airtight stove doors need replacement every few years.

**Seams** on stoves sealed with furnace cement may leak. Eventually the cement dries out, becomes brittle, and may fall out.

**Firebrick** may be broken or missing.

**Grate** or stove bottom where the fire is built - this may crack or break.



**NEVER FORGET** That There is a Box With a **FIRE** in it Inside Your House. Creosote Buildup Can Fuel a Chimney Fire That'll Burn Your House Down.

## Do You *PAY MORE* to Heat With Wood?

The chart below shows you which woods will produce the most heat per cord, and will help you compare your conventional home heating fuel to wood. Pound for pound, all woods have about the same heating value. **But hardwood logs are heavier and denser than softwood logs and burn longer, providing more heat per log.**

Firewood	Available Heat
Tree Species	(Million Btu/Cord)
60% Efficient Stove	
Alder	19
Almond	24
Apple	24
Cedar	14
Cherry	19
Eucalyptus	20
Elm, American	17
Fir, Douglas	19
Fir, White	15
Hemlock	14
Locust, Black	24
Madrone	24
Oak, Live	24
Oak, Red	21
Oak, White	23
Maple	19
Pine, Ponderosa	12
Pine, Sugar	12
Pine, White	12
Poplar	12
Redwood	12
Sycamore	18
Walnut, Black	20
Walnut, English	20
Willow	12

### One Million Btu of Fuel\* Equals:

293 kilowatt hours of electricity;

12.5 therms of natural gas; or

13.6 gallons of propane.

#### 1. What Do You Pay for a Unit of Fuel?

##### Check Your Utility Bill For Your Unit Price.

If you pay \$0.60 per therm for natural gas, one million Btu of gas will cost you  $12.5 \times \$0.60 = \$7.50$ .

#### 2. What Did You Pay for a Cord of That Wood?

You just bought a cord of Almond for \$195. Almond wood has a heat value of 24 million Btu per cord, burned in a 60% efficient stove.

#### 3. How Does Heating with Gas Compare to Burning a Cord of Almond ?

You would pay  $\$7.50 \times 24 = \$180$  for gas, \$15 less than you paid for the cord of Almond.

**In most areas of California you will pay more to heat with wood than to heat with gas, and less to heat with wood than to heat with electricity.**

However, if you get a new, certified stove and your new stove's heating efficiency is 80%, you can increase the Btu **heat energy available** in each cord of wood by 20%. Using the example above, a cord of Almond burned in an 80% efficient stove would have 28.8 million Btu of heat, not just 24. You would pay  $\$7.50 \times 28.8 = \$216$  for 28.8 million Btu of gas, or \$21 more to heat with gas than with your \$195 cord of Almond.

---

\* Assuming an energy conversion process efficiency of 100% for an electric heater, 80% for a natural gas furnace, and 80% for a propane furnace. New model gas furnaces achieve up to 95% efficiency.

# Model Woodburning Ordinance

In 1998, the Bay Area Air Quality Management District developed a model woodburning ordinance to guide cities and counties wishing to regulate woodsmoke in their communities. Studies continue to demonstrate a link between particulate pollution and an increased incidence of disease and mortality. On an average winter day, about 40 percent of all Bay Area particulate pollution comes from woodsmoke.

If adopted by a Bay Area city or county, this ordinance would allow the installation of gas fireplaces, pellet stoves, or EPA-certified wood stoves in new housing or in the remodeling of homes with fireplaces.

The ordinance also includes a provision that prohibits woodburning when the Air District issues a Spare the Air Tonight advisory (see back cover).

For information on the model woodburning ordinance, contact the Air District's Public Information Office at (415) 749-4900.



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

## Need More Information? Call Us!

### Bay Area Air Quality Management District

939 Ellis Street  
San Francisco, CA 94109

#### Phone Numbers

Public Information Office	1 (415) 749-4900
Bay Area Air Quality Reports	1 (800) HELP AIR
<ul style="list-style-type: none"><li>• Daily Air Quality Readings</li><li>• Spare the Air Tonight Requests</li><li>• Agricultural Burn Days</li></ul>	
Industrial/Residential Complaints	1 (800) 334-ODOR
Report Smoking Vehicles	1 (800) EXHAUST
All Other Air District Business	1 (415) 771-6000

#### Websites

[www.baaqmd.gov](http://www.baaqmd.gov)  
[www.sparetheair.org](http://www.sparetheair.org)

The Bay Area Air Quality Management District was founded in 1955 to help reduce air pollution from industrial operations, motor vehicles, and residential sources in the Bay Area. The Air District covers Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwest Sonoma, and southern Solano counties.

# IT'S IN YOUR NEIGHBORHOOD !

Air pollution in the Bay Area doesn't just come from heavy industry and automobiles. It's also produced in your neighborhood during the winter months by woodburning.

On cold, still nights, it's common for an air inversion to cause a blanket of woodsmoke to hug the ground. While the smell of woodsmoke may conjure up festive thoughts, its health effects are anything but charming. Woodsmoke contains harmful gases such as carbon monoxide, hydrocarbons, and oxides of nitrogen; toxic substances like formaldehyde, benzene, and dioxin; and microscopic particles that may be trapped in your lungs for years.

An even greater amount of these pollutants is emitted into the night air if your wood is burned improperly. **To minimize woodsmoke pollution from your fireplace or woodstove, LIGHT IT RIGHT!**

**Call the Air District for —**

- ▲ More Woodburning Tips
- ▲ Daily Air Quality Reports
- ▲ "Spare the Air Tonight" Advisories
- ▲ Clean-Air Tips for Your Home and Car

## ***Light It Right !***

### **HOW TO BEST LIGHT YOUR FIRE!**

Manufactured logs burn cleaner than wood logs, with less ash to clean up afterwards.

If you use wood, ***burn only dry, seasoned wood.*** Much of a log's energy must be used to burn off excess moisture — energy that would otherwise go toward heating your home. Less-seasoned wood also produces more harmful air pollutants.

***Start a small fire using softwoods.*** Softwoods (such as pine and fir) ignite easily and burn fast to heat up the flue and firebox quickly.

***Add larger hardwood logs after the fire is going.*** Denser, split woods (such as oak and madrone) will burn longer and more evenly, thus producing more heat energy than softwood logs.

***Don't burn garbage, glossy paper,*** or wood that has been painted or chemically treated. All these materials can release harmful toxic chemicals.

***Where there's smoke, there's a bad fire.*** Excess smoke is a good sign that your fire wasn't lit properly or isn't being burned correctly.

## **1-800-HELP AIR**

## ***Spare the Air Tonight***

On the handful of nights when pollution levels are expected to approach unhealthy levels, the Air District encourages Bay Area residents to refrain from burning wood unless clean-burning woodstoves and fireplaces are used. On such days, a "Spare the Air Tonight" advisory will be issued at 10 am for that night. Call 1-800-HELP AIR to check the Bay Area's daily air quality report.



City of Palo Alto, Environmental Compliance  
Contact: Julie Weiss/Environmental Specialist  
Ph:650.494.7629  
[julie\\_weiss@city.palo-alto.ca.us](mailto:julie_weiss@city.palo-alto.ca.us)  
[www.city.palo-alto.ca.us/cleanbay](http://www.city.palo-alto.ca.us/cleanbay)

## City of Palo Alto Woodsmoke-related Dioxin Reduction

### Project Description

In response to regional concerns about dioxin emissions, the City of Palo Alto adopted a dioxin policy "to eliminate dioxin and its subsequent release to the environment..." The Environmental Compliance Division then developed a set of action items it would pursue to reduce dioxin emissions locally and regionally. One project, which developed simultaneously with the policy, acted to reduce woodsmoke-related dioxin pollution and to educate the public about woodsmoke health hazards. Specifically this effort resulted in:

- The adoption of an ordinance prohibiting the construction of new traditional wood-burning fireplaces within City limits (only gas fireplaces are allowed).
- A brochure explaining the fireplace ordinance requirements to residents and architects designing new homes and remodels.
- A multi-year seasonal public education campaign explaining health problems associated with woodsmoke.

### Prohibition of new woodburning fireplaces

The City of Palo Alto adopted an ordinance, effective July 1, 2000, prohibiting the construction of new wood burning fireplaces in residential and commercial buildings. The ordinance allows *existing* traditional wood burning fireplaces to be repaired, modified, and even relocated in the same house, but *new* structures may only install gas burning fireplaces. The ordinance does not apply to wood burning stoves used for cooking or outdoor fireplaces.

Brochures explaining the ordinance and woodsmoke concerns were sent to architects in surrounding communities and are distributed at the Development Center where building permits are issued.

### Public Education

**Winter, 1999:** Public education of woodsmoke and dioxin concerns began before the adoption of the policy or ordinance.

- A utility bill insert was sent out in February of 2000 explaining woodsmoke issues
- Small ads ran in local papers instructing residents how to burn fires more cleanly (the two messages were "Don't burn wrapping paper," and "Woodsmoke is a growing concern")
- Several newspaper articles ran discussing the proposed ordinance and dioxin issues.

**Fall, 2000:**

Public education will begin during the start of fireplace season and will include:

- An elementary school poster contest challenging students to design messages explaining how to reduce woodsmoke hazards.
- Movie theater ads featuring the artwork and messages of poster contest winners
- A brochure discussing woodsmoke concerns will be distributed via a local paper in early December and offer a coupon worth \$1 off on compressed firelogs at local stores.
- A revised utility bill insert to run in December.

**Future plans**

- Partner with Utilities Department to provide rebates to residents who replumb existing fireplaces with gas lines.
- Revisit public education strategy next year.

**Lessons learned**

Be prepared to defend your position on dioxin issues. There is skepticism around how much dioxin is generated from woodsmoke and its impact. Even in-house there was some disagreement about the issue's relevance. Palo Alto relied on the Bay Area Quality Management District's *Information Update* (12/98), and *Woodsmoke Fact Sheet* (12/98) as references.

**Costs:**

Fireplace brochure (for architects and home owners)/design, printing and mailing: \$2,800

Movie theater ads (two months): \$5,600

Elementary school poster design: \$1,500

**Resources**

Copies of the City of Palo Alto dioxin policy, fireplace ordinance, and public education materials are available by calling 329.2495, or visit: [www.city.palo-alto.ca.us/cleanbay](http://www.city.palo-alto.ca.us/cleanbay).



# A HOT DEAL!

Get \$1 off a 'fire log' of your choice with this coupon.

We want to kindle your interest in the certified 'fire logs' in your fireplace instead of wood. Fire logs are warm, beautiful, and generate 50% less particulate, carbon monoxide and health-threatening chemicals than wood. For more information or, visit [www.sparetheair.org/wbh/wbh01.htm](http://www.sparetheair.org/wbh/wbh01.htm).

#### Participating stores:

##### EAST PALO ALTO

**Home Depot**  
1781 East Bayshore Road

##### PALO ALTO

**Palo Alto Hardware**  
875 Alma Street

**Long's Drug Stores**  
• 2701 Middlefield Road  
• 352 University Avenue

Walgreens  
• 3000 El Camino Real  
• 4170 El Camino Real

##### MOUNTAIN VIEW

**Blain's Farm & Fleet**  
1000 El Camino Real

##### LOS ALTOS

**Rancho Hardware**  
1150 Riverside Drive

**Albertsons**  
2175 Grant Road

**Safeway**  
160 First Street

#### Pharmacies and stores:

Mail coupons to Regional Quality Control Plant,  
2501 Embarcadero Way, Palo Alto, CA 94303  
(650) 329-2495.

Store name: \_\_\_\_\_

Address: \_\_\_\_\_

Contact name/phone: \_\_\_\_\_

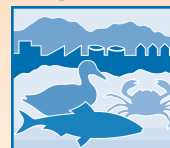
Coupon expiration date March 1, 2001

## A Growing Concern

# Woodsmoke Pollution



#### Regional Water Quality Control Plant



2501 Embarcadero Way  
Palo Alto, CA 94303  
(650) 329-2495  
email: [cleanbay@city.palo-alto.ca.us](mailto:cleanbay@city.palo-alto.ca.us)  
[www.sparetheair.org/wbh/wbh01.htm](http://www.sparetheair.org/wbh/wbh01.htm)

Operated by the City of Palo Alto for the East Palo Alto Sanitary District,  
Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford



Printed on 30% post-consumer recycled content paper



In winter, fireplaces and wood-stoves generate 40 percent of the Bay Area's particulate air pollution. The very fine particles — invisible to the eye — are the most harmful to health because they lodge deep in the lungs.

Bay Area Quality Management  
District woodsmoke  
factsheet (BAAQMD), 12/98

Woodsmoke contributes 39 percent of dioxin air emissions in the Bay Area. Woodsmoke is also an important source of dioxins and other toxic compounds.

BAAQMD Information  
update, 12/98

EPA lists San Francisco Bay as an impaired water way due, in part to dioxin.

BAAQMD 5/00

## Health problems associated with woodsmoke

Numerous scientific studies show significant correlations between exposure to woodsmoke and a variety of respiratory ailments, lung cancer, and even premature death. Those most at risk for health problems due to woodsmoke are small children, the elderly, and people with asthma or emphysema.



## Air pollution causes water pollution!

In the Bay Area, woodsmoke can easily become a water pollution problem. Some of the particles and related toxins in the air fall back into the Bay. The toxic effects of this transformation of air pollution into water pollution are now documented. The U.S. Environmental Protection Agency has recently listed San Francisco Bay as impaired due to the buildup of dioxins and other contaminants in fish tissues!



## How to reduce pollution from your existing (traditional) fireplace

Minimize use of your traditional fireplace. Save that romantic glow for special occasions!

### If you do burn, follow these guidelines:

- Burn only seasoned hardwood (oak, almond, madrone, apple).
- Minimize burning of softwoods (pine, poplar, cedar, redwood).
- Never burn garbage, plastic, glossy or colored paper, or scrap wood that has been painted or stained.
- Make sure the fire is very hot and has a good air flow. Don't try to "choke it down."
- Burn manufactured ("densified") logs. Logs made of compressed sawdust burn slowly at high temperatures, producing less smoke and emitting 50 percent less fine particulates, carbon monoxide, and volatile organic compounds (VOCs).

For detailed information about how to burn safely and heat with wood, call the Regional Water Quality Control Plant, (650) 329-2495, or visit [www.sparetheair.org/wbh/wbh01.htm](http://www.sparetheair.org/wbh/wbh01.htm)

In 2000, Palo Alto woodsmoke concerns led to an ordinance allowing only gas fireplaces to be built in new homes.

A natural gas fireplace eliminates more than 99 percent of the pollution generated by a traditional fireplace, and is six to nine times more energy-efficient!

**RESOLUTION FOR THE COUNTY OF ALAMEDA**  
**ESTABLISHING A POLICY ON PERSISTENT, BIOACCUMULATIVE TOXINS**  
**AND THEIR EFFECTS ON PUBLIC HEALTH AND THE ENVIRONMENT**

R-2002-377

**Whereas**, a group of pollutants known as Persistent, Bioaccumulative Toxins (PBTs) are toxic, persistent in the environment and accumulate in the food chain, and these characteristics, along with the ubiquity of PBTs in the worldwide environment, pose public and environmental health risks;

**Whereas**, the United States Environmental Protection Agency (US EPA) has established a list of 12 priority PBTs, including dioxins, PCBs, mercury and its compounds, lead and others, some of which have been linked to increased cancer risk, harm to children, infants and the unborn, disorders of the immune, developmental, endocrine, hormonal, and reproductive systems, as well as other human health problems;

**Whereas**, US EPA's June 2000 reassessment of dioxins health effects estimates that the general public's exposures are near levels that may cause adverse health effects;

**Whereas**, County residents who consume fish from the Bay are at additional risk, as PBT contamination in fish reaches health advisory levels throughout the San Francisco Bay, and San Francisco Bay fish consumers are predominantly low income and people of color;

**Whereas**, low income people and people of color are more likely to live near a source of PBT pollution;

**Whereas**, workers often face disproportionately high exposures to toxic substances found in their work places;

**Whereas**, Certain PBTs have been linked to adverse effects on water quality and aquatic ecosystems, and the San Francisco Bay is listed by the US EPA as impaired by PBTs;

**Whereas**, PBTs have been detected in measurements of treated waste water discharged from pollution sources in the Bay Area and state and local water quality agencies may, as a result, come under a federal mandate to implement new local controls of these pollution sources;

**Whereas**, sources of new PBT pollution are varied and include industrial and commercial processes and products as well as residential activities and certain facilities that are PBT sources are of special concern for neighboring communities;

**Whereas**, other PBTs exist whose chemistry, sources, concentrations and health effects are as yet poorly understood or unknown, which may add to the toxic health effects of US EPA's priority PBTs, and for which no regulatory standards exist;

**Whereas**, respected expert associations and agencies including the California Medical Association, the American Public Health Association, the United Nations Environment Program, the International Joint Commission of the U.S. and Canadian governments, and The California Water Resources Control Board have agreed upon the need to reduce or eliminate PBTs in the environment;

**Whereas**, pollution prevention is recognized as the strategy most highly protective of public and environmental health and most effective in reducing and eliminating releases of PBTS, and cost-effective pollution prevention options as well as environmentally preferable treatment practices and technologies exist for many PBT sources;

**Whereas**, in 1991, the County of Alameda has expressed its support for such pollution prevention activities through the establishment of a County Service Area to address lead in the form of lead-based paint hazards;

**Whereas**, PBT exposures can be reduced through procurement, design, operation, work practice and disposal decisions that reduce or eliminate releases of PBTs;

**Whereas**, exposure to PBTs is a clear threat to public and environmental health, local PBT contamination has a disproportionate impact on children, low-income and minority communities, PBT exposure affects all residents of the County of Alameda and the Bay Area; and pollution prevention strategies exist that can be implemented by County government and by others within the County of Alameda;

Now Therefore, be it:

**Resolved**, that the County of Alameda considers PBT pollution prevention a high priority for action to protect public and environmental health, and intends by this resolution to encourage the reduction and where feasible, the elimination of PBT emissions; and be it

Further **Resolved**, that the County of Alameda intends to implement PBT pollution prevention practices wherever practicable in County operations and will promote such pollution prevention practices in County-based facilities and health care institutions, other government facilities, businesses and households in the County; and be it

Further **Resolved**, that the County of Alameda establishes the Alameda County PBT Committee with the mission to advise and make recommendations to the Board of Supervisors and to the agencies on PBT pollution prevention policies and practices; and be it

Further **Resolved**, that the PBT Committee shall be chaired by the Director or designee of the Environmental Health Department and composed of the Directors or designees of the Public Works Agency, General Services Agency, the Fire Department and other appropriate county offices, and shall seek the participation of the Alameda County Medical Center, the Alameda County Lead Poisoning Prevention Program, which shall meet as needed and shall seek the participation of stakeholder groups; and be it

Further **Resolved**, that the County of Alameda will work with other government agencies, industry and the public on pollution prevention efforts to protect environmental and public health and to implement plans to reduce PBT releases at their sources; and be it

Further **Resolved**, that the County of Alameda is committed to assisting businesses in obtaining technical and financial assistance for the reduction and where feasible, the elimination of PBTs; and be it

Further **Resolved**, that the County of Alameda is committed to protecting workers' jobs and therefore will pursue PBT reduction practices that do not cause workers to become unemployed and relocated; and be it

Further **Resolved**, that the County of Alameda forwards this resolution, and encourages other Bay Area counties and cities to adopt a similar resolution.

ALAMEDA COUNTY BOARD OF SUPERVISORS, OAKLAND, CALIFORNIA, January 29, 2001

PASSED BY THE FOLLOWING VOTE:

AYES- Supervisors Carson, Lai-Bitker, Miley, Steele, & President Haggerty - 5

NOES- None

ABSENT- None

ABSTENTION- Non

ATTEST

\_\_\_\_\_  
R. Bailey, Deputy Clerk of the Board of Supervisors,  
County of Alameda, California

Approved as to Form by

Tamara M. Wiggins

County Counsel

**RESOLUTION FOR THE CITY OF OAKLAND  
ESTABLISHING A REGIONAL TASK FORCE AND POLICY ON  
DIOXIN, PUBLIC HEALTH AND THE ENVIRONMENT**

**Whereas**, the term dioxin represents a group of chemicals which includes furan and biphenyl Compounds<sup>1</sup> with the most well-known dioxin, 2,3,7,8-TCDD, believed to be the single most carcinogenic chemical known to science<sup>2</sup>;

**Whereas**, dioxin is a toxic waste byproduct that occurs when chlorinated waste is burned and when other organic chemicals that contain chlorine are manufactured and which in itself has no commercial or industrial use<sup>1</sup>;

**Whereas**, dioxin is dangerous to human health, is ubiquitous in the worldwide environment and is a known human carcinogen<sup>3</sup>;

**Whereas**, the U.S. EPA estimates that the lifetime risk of getting cancer from dioxin exposure is above generally accepted safe levels<sup>4</sup>, and the U.S. EPA's Dioxin Reassessment has found dioxin 300,000 times more potent as a carcinogen than DDT (the use of which was restricted in the U.S. in 1972)<sup>5</sup>;

**Whereas**, dioxin is an endocrine disrupting chemical affecting thyroid and steroid hormones and almost every hormone system examined has been shown to be altered by dioxin in some cell-type, tissue or developmental stages<sup>5</sup>;

**Whereas**, dioxin has been linked to endometriosis<sup>7</sup>; immune system impairment, diabetes, neurotoxicity, birth defects (including fetal death), decreased fertility, testicular atrophy and reproductive dysfunction in both women and men<sup>5, 6</sup>;

**Whereas**, dioxin exposure is significant and universal: over 90% of human exposure to dioxin occurs through diet<sup>9, 10</sup> and every person in the world now carries a "body burden" of dioxin<sup>5, 8</sup>;

**Whereas**, Americans ingest a daily amount of dioxin that is already 300-600 times higher than the EPA's so-called "safe" dose<sup>5, 8</sup> and the U.S. EPA estimates that eating just a quarter pound of Bay fish daily causes cancer risks to increase to a level of nearly one in 1,000<sup>11</sup>;

**Whereas**, Oakland residents who consume fish from the Bay are at additional risk<sup>12</sup>; dioxin contamination in fish reaches health advisory levels throughout the San Francisco Bay<sup>13</sup>; and San Francisco Bay fish consumers are predominantly low income and people of color<sup>12</sup>;

**Whereas**, dioxin is found in the breast milk of woman worldwide with the highest concentrations found in women from industrialized countries<sup>14</sup> and nursing infants take in 50-100 times more dioxin than adults due to drinking contaminated breast milk<sup>15</sup>;

**Whereas**, workers often face disproportionately high exposures to toxic and/or hazardous substances found in their work places, and often there are alternative technologies that can reduce or eliminate the exposure;

**Whereas**, pollution prevention programs are good for the economy because they result in a net increase in employment, facilitating the just transition of displaced workers from jobs in dioxin-creating industries to jobs in pollution prevention and recycling industries;

**Whereas**, respected expert associations and agencies including the California Medical Association<sup>16</sup>, the American Public Health Association<sup>17</sup>, the Chicago Medical Society<sup>18</sup> and the International Joint Commission<sup>19</sup>, comprised of the governments of Canada and the U.S., have agreed upon the need to reduce or eliminate dioxin in the environment;

**Whereas**, dioxin has been detected in measurements of treated waste water discharged from pollution sources in the Bay Area<sup>20</sup> and the San Francisco Bay Regional Water Quality Control Board has resolved that dioxin is a high priority for immediate action to restore water quality and protect public health<sup>21</sup>;

**Whereas**, major sources of dioxin pollution include medical and hazardous waste incineration, the production of polyvinyl chloride (PVC) plastics, biomass combustion, diesel exhaust, pesticide

manufacturing, paper production, oil refineries<sup>22</sup>, and urban street runoff<sup>23</sup> municipal waste incineration, secondary copper smelting, sewage sludge incineration, residential wood burning, forest fires, industrial wood burning, cement kilns;

**Whereas**, the healthcare industry is one of the largest producers of dioxin in the United States.<sup>24</sup> Bay Area and out-of-state public health care institutions generate significant amounts of medical waste that threaten or harm public health, fishing and aquatic life throughout San Francisco Bay<sup>23, 27</sup>;

**Whereas**, no regulatory authority considers the additive effect of all the dioxin sources on the surrounding community;

**Whereas**, a strategy which eliminates the production of dioxin is the only viable course in protecting public health since once dioxin is produced, it is very difficult to destroy or degrade<sup>19, 27</sup>;

**Whereas**, adverse health effects from dioxin exposure can be reduced through purchasing decisions that reduce or eliminate products that produce dioxin (such as PVC-free plastic or chlorine-free paper); and alternative, less toxic options exist for many products that create dioxin<sup>2</sup>;

**Whereas**, pollution prevention is recognized as the most effective waste management strategy<sup>28</sup>;

**Whereas**, careful waste segregation has been proven to reduce dramatically the medical waste requiring incineration<sup>29</sup> and cost-effective technologies which are alternatives to incineration exist for almost all the waste that does need special handling<sup>20</sup>;

**Whereas**, dioxin is a clear threat to public health and the environment, zero exposure is the only strategy that truly protects public health<sup>31</sup> local dioxin contamination has a disproportionate impact on low-income and minority communities<sup>32, 33</sup>; and dioxin exposure affects all residents of Oakland and the Bay Area<sup>34</sup>;

**Whereas**, that the City of Oakland has sent a letter to the U.S. Environmental Protection Agency supporting its proposal to require community right to know reporting of dioxin releases and supporting the National Environmental Justice Advisory Committee's advice to make dioxin pollution of San Francisco Bay a high priority under Clean Water Act section 303(d).

Therefore, be it

**Resolved**, that the City of Oakland intends by this resolution to encourage elimination of dioxin emissions wherever possible: and be it

**Further Resolved**, that the City of Oakland designates dioxin pollution as a high priority for immediate action to restore water, air, soil, and food quality and protect public health; and be it

**Further Resolved**, that the City of Oakland will work with other local governments to convene a regional task force to identify and quantify the sources of regional dioxin pollution, including sources from all municipal practices; this task force would also develop dioxin pollution prevention strategies along with any associated cost implications, and make any further recommendations to implement the intent of this resolution (the elimination of dioxin); and be it

**Further Resolved**, that the City of Oakland intends to implement dioxin pollution prevention practices in all waste management and recycling programs by City departments, and encourage such pollution prevention practices in all hospitals and businesses that operate in the City: and be it

**Further Resolved**, that the City of Oakland promotes the use of less-toxic, non-chlorinated, sustainable alternative products and processes, such as chlorine-free paper and PVC-free plastics to the extent possible: and be it

**Further Resolved**, that the City of Oakland joins in urging Oakland health care institutions to reduce PVC use and eventually become PVC-free; and be it



**Further Resolved**, that the City of Oakland forwards this resolution, and encourages the Port of Oakland to adopt a similar resolution: and be it

**Further Resolved**, that city staff will recommend to council ways the city can prevent dioxin pollution; and be it

**Further Resolved**, that the City of Oakland is committed to eliminate no workers jobs and therefore will pursue dioxin reduction practices that do not cause workers to become unemployed; and be it

**Further Resolved**, that the City of Oakland will send a letter to Oakland-based health care institutions, to encourage them to phase out the use of PVC products: and be it

**Further Resolved**, that the City of Oakland send a letter to the Bay Area Air Quality Management District (BAAQMD) supporting zero dioxin emission and zero dioxin exposure and urging the BAAQMD to eliminate dioxin pollution into the air; and be it

**Further Resolved**, that the City of Oakland send a letter encouraging the Regional Water Quality Board to exercise its full power and jurisdiction, as intended by the Porter-Cologne Water Quality Act and the federal Clean Water Act, to protect the quality of water from degradation and to implement a plan to phase out dioxin at its sources.

#### Dioxin Resolution Citations

<sup>1</sup> Courture, L. et al, 1990. A Critical Review of the Developmental Toxicity and Teratogenicity of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin: Recent Advances Toward Understanding the Mechanism. *Teratology* 41:619-627. 1990.

<sup>2</sup> Healing the Harm: Eliminating the Pollution from Health Care Practices, Health Care Without Harm Campaign Report. 1997; and Huff, 1994.

<sup>3</sup> International Agency for Research on Cancer (IARC) of the World Health Organizations, United Nations, 1997. National Toxicology Program Board of Scientific Counselors of the National Institute of Environmental Health Sciences, 1997.

<sup>4</sup> Mariani, Jay. Dioxin Fact Sheet, Environmental Law and Justice Clinic, Golden Gate University, San Francisco, 1998,

<sup>5</sup> US EPA. Risk Characterization of Dioxin and Related Compounds: Draft Scientific Reassessment of Dioxin. Washington, D.C.: Bureau of National Affairs. May 3, 1994.

<sup>6</sup> Birnbaum, Linda et al. Developmental Effects of Dioxins and Related Endocrine Disrupting Chemicals. *Experimental Toxicology Division, US EPA. Toxicology Letters*, p. 743-750. 1995.

<sup>7</sup> Rier, S.E. et al Endometriosis in Rhesus Monkeys (Macaca Mulatta) Following Chronic Exposure to 2,3,7,8-Tetrachlorodibenzo-p-dioxin. *Fundamental and Applied Toxicology*. Vol. 21, pp.433-441, 1983.

<sup>8</sup> DeVito, Michael et al, Comparisons of Estimated Human Body Burdens of Dioxin-like Chemicals and TCDD Body Burdens in Experimentally Exposed Animals, pp. 820-831, 1995. Economic Analysis of the Proposed California Water Quality Toxics Rule, US EPA. 1997.

<sup>9</sup> Schechter, A., 1991. Levels of Dioxins, Dibenzofurans, PCB and DDE Congeners in Pool Food Samples Collected in 1995 at Supermarkets Across the United States. *Chemosphere*, Vol. 34, Nos 5-7. pp. 1437-1447, 1994: and Congener-Specific Levels of Dioxin and Dibenzofurans in U.S. Food and Estimated Daily Dioxin Toxic Equivalent Intake. *Environmental Health Perspectives*, 1994.

<sup>10</sup> Testimony of Dr. William Farland in the dioxin science workshop heard by the RWQCB May 7, 1998.

<sup>11</sup> U.S. EPA. Economic Analysis of the Proposed California Water Quality Toxics Rule, pp. 8-11, 1997.

<sup>12</sup> RWQCB at al. Contaminant Levels in Fish Tissue from San Francisco Bay. 1995.

<sup>13</sup> OEHA. "Health Hazard: Catching Fish and Eating Sport Fish In California", Interim Sport Fish Advisory for San Francisco Bay. California Office of Environmental Health Hazard Assessment, California. EPA. December, 1994.

<sup>14</sup> Schechter, A. Dioxins. in *Humans and the Environment. Biological Basis for Risk Assessment of Dioxins and Related Compounds*, Banbury Report 35: 169-214. 1991.

<sup>15</sup> Linstrom, Gunilla, et al. Workshop on Prenatal Exposure to Dioxin-like Compounds I. Summary, *Environmental Health Perspectives*, Volume 103, Supplement 2, March 1995.

<sup>16</sup> California Medical Association, Resolution, 1998.

<sup>17</sup> American Public Health Association, Resolution 9607, 1996.

<sup>18</sup> Chicago Medical Society, Resolution, 1998.

<sup>19</sup> Sixth Biennial Report on Great Lakes Water Quality, Washington, D.C. and Ottawa, Ontario:International Joint Commission, 1992.

<sup>20</sup> Self-monitoring Reports Submitted to the RWQCB by the Tosco, Unocal, and Pacific Refining Oil Refineries and the San Francisco Southeast, San Jose/Santa Clara. Sunnyvale, Union Sanitary District, and West County Agency Sewage Treatment Plants.

<sup>21</sup> Regional Water Quality Control Board, Policy Statement on Dioxin, February 18. 1998.

<sup>22</sup> Thomas, V. et al. An Estimation of Dioxin Emissions in the United States. Department of Chemistry and Center for Energy and Environmental Studies, Princeton University. *Toxicological and Environmental Chemistry*, Vol. 50, pp. 1-37. 1995.

<sup>23</sup> Maher, O. et al 1997. PCDD/PCDF Levels in the Environment: In Storm Water Outfalls Adjacent to Urban Areas and Petroleum Refineries in San Francisco Bay, CA, USA. *Organohalogen Compounds*, Vol. 32.

- <sup>24</sup> California Technical Support Document for Medical Waste incinerators, California Air Resources Board, 1990. Dioxin Sources, US EPA. 1996.
- <sup>25</sup> California Air Resources Board Medical Waste Inventory 1997.
- <sup>26</sup> Bay Area Hospital Medwaste Survey. Jennifer Altman Foundation. March, 1998.
- <sup>27</sup> California Zero Dioxin Exposure Alliance Letter to Loretta Barsamian, Executive Director, Regional Water Quality Board, San Francisco Bay Region, February 6. 1998.
- <sup>28</sup> Pollution Prevention Act of 1990, U.S. Congress.
- <sup>29</sup> American Hospital Association. "An Ounce of Prevention: Waste Reduction Strategies for Health Care Facilities". 1993
- <sup>30</sup> California Technical Support Document for Medical Waste incinerators. California Air Resources Board, 1 990
- <sup>31</sup> Seventh Biennial Report on Great Lakes Water Quality. International Joint Commission, 1994.
- <sup>32</sup> Moffat, S. "Minorities Are More Likely To Live Near Toxic Sites". Los Angeles Times, p. 81. August. 1995.
- <sup>33</sup> National Environmental Justice Advisory Committee to the U.S. EPA, June 3. 1998.
- <sup>34</sup> Schecter, A., Dioxins in U.S. Food and Estimated Daily Intake. Chemosphere, Vol. 29. Nos. 9-1 1. pp.2261-2265, 1994.